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## CONSUMER PERCEPTION OF VEGETABLE (TOMATOES AND MORNING WATER GLORIES) QUALITY IN HANOI

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CIRAD  
June 2004

FSP Project 2000 – 56 funded by the French Ministry of Foreign Affairs

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# TABLE OF CONTENTS

<b>SUMMARY .....</b>	<b>4</b>
<b>I. INTRODUCTION AND REASONS FOR THIS STUDY .....</b>	<b>6</b>
<b>II. PROTOCOL .....</b>	<b>10</b>
PERCEIVED QUALITY OF PERI-URBAN VEGETABLES.....	10
QUALITY SIGNS RELATIVE TO TOMATO AND WATER MORNING GLORY .....	10
<b>III. RESULTS.....</b>	<b>12</b>
PERI-URBAN VEGETABLES.....	12
TOMATO AND WATER MORNING GLORY .....	14
THE TOMATO .....	15
• The Safe Tomato .....	16
• The Da Lat Tomato .....	17
• The Chinese tomato.....	18
• The Organic Tomato .....	19
• Supermarket tomatoes.....	20
• The 'peri-urban' tomato .....	21
THE WATER MORNING GLORY .....	22
• A quality water morning glory.....	22
• A safe water morning glory .....	23
• The organic water morning glory .....	24
• The supermarket water morning glory .....	24
• The peri-urban water morning glory.....	25
<b>IV. DISCUSSION .....</b>	<b>26</b>
• The categorisation of vegetables .....	26
• Sought after quality attributes .....	27
• Product and quality identification .....	27
<b>V. CONCLUSIONS .....</b>	<b>31</b>
• Confidence .....	31
• The buyer's experience.....	31
• The consequence for sales.....	32
• Risk perception .....	33
<b>BIBLIOGRAPHY .....</b>	<b>34</b>
<b>ANNEXES .....</b>	<b>35</b>

## LIST OF TABLES

---

Table 1: Shares of different types of tomatoes and water morning glories on the Hanoi market ...	9
Table 2: Inducing word pairs used in word association study .....	10
Table 3: Main advantages of peri-urban vegetables .....	12
Table 4: Main defects of peri-urban vegetables .....	12
Table 5: Advantages of peri-urban vegetables for farmers and non-farmers .....	13
Table 6: Defects of peri-urban vegetables for farmers and non-farmers .....	14
Table 7: Descriptions of a quality tomato .....	15
Table 8: Description of a safe tomato.....	17
Table 9: Description of Da Lat tomatoes .....	18
Table 10: Description of Chinese tomatoes .....	19
Table 11: Description of organic tomatoes.....	19
Table 12: Descriptions of supermarket tomatoes.....	20
Table 13: Description of a peri-urban tomato .....	21
Table 14: Description of a water morning glory of good quality .....	23
Table 15: Description of a safe water morning glory .....	24
Table 16: Description of an organic water morning glory.....	24
Table 17: Description of supermarket water morning glories.....	25
Table 18: Description of a peri-urban water morning glory .....	25

## LIST OF DIAGRAMS

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Diagram 1: Quality attributes of tomato.....	28
Diagram 2: Quality attributes of water morning .....	29

## SUMMARY

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*A quantitative survey conducted in 2003 on 500 Hanoi consumers has allowed us to identify their perception of peri-urban vegetables. Then, a qualitative survey, based on word association, have allowed us to identify with more details the perception of those consumers in regards to the two most widely consumed vegetables: tomatoes and water morning glories. A good tomato is one which is floury, firm and fresh. A good water morning glory comes from a pond and has slender stems and green leaves. The study focused on quality perceptions of products from China, products from Da Lat, peri-urban products, organic products, "safe" products, and products sold in supermarkets. The results of this study show that these products stand out for their health qualities on the one hand, and their visual and organoleptic qualities on the other hand. Chinese products fall short on all counts. Supermarket products are highly appreciated but are considered expensive. Organic and "safe" vegetables have bad visual and organoleptic qualities and "safe" vegetables do not inspire confidence. On the contrary, peri-urban produce has high visual and organoleptic qualities but are not considered healthy. Confidence in product quality is largely a function of the seller's image and the place of sale. This study ends on some recommendations for better marketing these products.*

This report is the result of research conducted in 2003 in the framework of the SUSPER project (Southeast Asia Regional Peri-urban Agriculture Project, Component 2 – Market and development, A3 – Consumption behaviour). In various degrees this research involved Muriel Figuié, Tran Tri Tham CIRAD, Nguyen Thi Minh Nguyet, Anthropology/Ethnology Institute of the Vietnamese National Centre for Social and Human Sciences (IE/CNSSH), Nguyen Duc Truyen of the CNSSH Sociology Institute. This report is also partly based on data collected by the economic team of Rifav through a study on "Quantitative assessment of consumption behaviour". I would like to thank this team for this collaboration and in particular Nam Ngo Van. I am also grateful to Paule Moustier, Boun-Tieng Ly and J.J. Cadilhon for their careful reading of this report.

*Muriel Figuié, Hanoi, June, 2004*

## I. INTRODUCTION AND REASONS FOR THIS STUDY

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An analysis of vegetable consumption was carried out in the framework of the SUSPER project in 2002. This analysis touched on quantitative aspects – such as the evolution of quantities consumed on the national level – as well as on qualitative aspects – health risks associated with food consumption by consumers.

It is possible to observe that producers are currently taking steps to respond to consumers' concerns. These steps are meeting with only limited success due to the confusion in the messages transmitted (Moustier et al, 2003) and the low level of confidence consumers have in those messages.

This first analysis raises a question address to us by Susper project: in this context of increasing demand of vegetables in urban areas and of increasing concerns on food quality, is there an opportunity for peri-urban vegetables?

To respond this answer, we proceed in three steps, combining different methodologies:

1. *Perceived quality of Peri-urban vegetables.* We took advantage of a survey conduct in Susper project on food consumption in 2003 to introduce few questions on perceived qualities and defects of peri-urban vegetables. These questions were addressed to 500 Hanoian consumers.

2. *Quality signs relative to tomato and water morning glory* Then we undertook, in the same year, a qualitative study on the meaning of "good quality" for householders and how they perceived the different origins of vegetables present on Hanoi markets. This survey, based on 55 in-depth interviews, was limited to two common species, tomato and water morning glory.

3. Finally, we organised focus groups to understand consumers' qualification and confidence building processes. In other words, how do consumers qualify vegetables and what information do they use to evaluate these products? In which quality symbols do they put their faith and why? We hold 4 focus groups of around 10 people, belonging to 4 different economic levels. Discussion focused again on tomato and water morning glory. These groups have been built up, and the discussion has been conducted in partnership with the Vietnam consumers association (VINASTAS). The results of this study will be presented in a separate report.

The choice of the species, water morning glories and tomatoes was made due to their quantitative importance in Vietnamese consumption habits. The water morning glory is the 2<sup>nd</sup> (47.9 g/per/day) and tomatoes are the 5<sup>th</sup> (18.8 gr/per/day) most consumed vegetables out of about 70 different species and sub-species regularly consumed in Hanoi (Mai Thi Phuong Anh et al 2003, and annex 1).

On the other hand, in the case of tomatoes this choice is linked to the diversity of existing formal and informal signs: there is a large variety of tomatoes available in Hanoi markets, notably different geographic origins. We were able to observe in previous studies (Bridier, 2000; Figuié, 2003) that consumers give variable confidence ratings to these origins.

Finally, concerning water morning glory, our choice was made in function of our concern for the health factor: the sanitary quality of a product is a major component in the question of vegetable quality in the eyes of Hanoi consumers, according to a study done in Hanoi in 2002, (Figuié, 2003). According to this study the water morning glory was judged to be the most dangerous of all fresh produce by consumers. Consumers are very concerned about the presence of residual agrochemicals.

Also, we have focused our attention on the quality and the confidence consumers associate with the following elements:

- geographical origin: peri-urban, China, Da Lat
- production process: 'clean vegetables', organic vegetables
- place of sale: supermarket

In the vocabulary of researchers and development officers, these categories have the following meanings:

- *Peri-urban vegetables*: these are vegetables which are produced in a radius of 50 km of the city. These vegetables are associated with a polluted environment, intensive production in competition with other activities in a context of land speculation. On the other hand, these vegetables are also the product of a 'multifunctional' agricultural activity, which is to say that above and beyond its purely productive function it also plays an important role in job creation, supplying local markets and providing nature spots to the urban population.
- *Da Lat vegetables*: Da Lat is a hilly region 1,000 km south of Hanoi. It served as a summer residence to the colonial elite in search of fresh air and is today renowned for its production of temperate fruits and vegetables all year round. It is an important supply source for Hanoi markets especially when local production is down during the hot season from April to October. In August, for example, 15% of all tomatoes sold in Hanoi come from Da Lat (Hoang Bang An et al, 2003). Da Lat also supplies Phnom Penh markets with between 25% and 100% of its needs in tomatoes, green cabbage and Chinese cabbage, depending on the product and the season (according to studies done by the SUSPER project on Phnom Penh markets which are currently undergoing analysis).
- *Chinese vegetables*: the Chinese border is about 250 km from Hanoi. Large quantities of fruit and vegetables come from China, especially during the hot season: in August, up to 80% of all tomatoes sold in Hanoi come from China, op. cit.. Replacing this Chinese production by local production is the recurrent theme of many projects, including and especially the SUSPER project. Previous studies have shown the permanent distrust Vietnamese consumers have towards Chinese products which are suspected of being subjected to fraudulent practices, such as having sugar injected into them or being dipped in excessive amounts of preserving agent. Unfortunately, we do not have enough data, such as chemical analysis or studies on Chinese producers, to prove or disprove these rumours.

- *Safe vegetables*: these are vegetables that were grown either as part of a Hanoi People's Committee programme which began in 1995, or the Integrated Pest Management (IPM) programme launched by the FAO and Danish co-operation (ADDA). Both of these programmes are ongoing. These vegetables have been given different names: 'rau sach' or 'rau an toan', meaning 'clean vegetables' and 'safe vegetables' ('legumes IPM' in French). In the rest of this document we shall refer to them as 'safe vegetables', even though it is not very precise. It refers to the Vietnamese term 'rau an toan', which is used most often by Vietnamese consumers and was therefore used during our study. The term 'IPM vegetable' would certainly be more precise. In the production of safe vegetables, the use of chemical products is possible, but only in limited quantities in relation to the production of 'ordinary' vegetables. This limitation takes place by using optimum doses of fertiliser, which are adapted to the stage of the plant's development and pesticide doses adapted to the illnesses and insects to be treated, respecting the recommended delays for each agrochemical, which corresponds to the residual delays of active materials, between the treatment and the harvest. These limits imply minute and regular observation of the crops. Diverse research work has shown that these products lack credibility, since there is no real control system (Moustier et al, 2003). These vegetables are sold in speciality shops, known as 'safe vegetable shops', at certain market stalls with the sign 'rau sach' or 'rau an toan' and in supermarkets – often with no distinctive marking or just the name of a co-operative.
- *Organic vegetables*: the main difference between organic and safe vegetables is in the use of chemical products: organic production is carried out according to a specifications sheet allowing the use of no chemicals whatsoever, either for fertilising or protecting the plants. Only 'natural' products are used, such as vegetal compost for fertilising or copper as a fungicide (Moustier, et al, 2003). These vegetables are sold at rare points of sale bearing the sign 'Hanoi Organic'. They are mostly sold to restaurants and make up a very small percentage, less than 0.1% (see table 1), of vegetables sold in Hanoi.
- *Vegetables sold in supermarkets*: supermarkets are relatively new to Hanoi. Non-existent 15 years ago, there are now 32 in the Capital and 38 in Ho Chi Minh City. Less than 2% of all vegetables sold in Hanoi are in supermarkets (Nguyen Thi Tan Loc, 2002). Many of them buy from producers of safe vegetables. Supermarkets are often privileged as discussion partners by researchers and developers working on food quality: Supermarkets on one hand, since they carry a lot of weight given the quantities they buy, can be more demanding on the quality of vegetables they buy to their suppliers. On the other hand, their clientele is wealthy and agree to pay supermarkets vegetables 10% to 30% above market prices, which is an opportunity to sell value-added products such as quality vegetables.

These categories often overlap. Safe and organic vegetables are mostly produced in the outskirts of Hanoi (by the Van Tri co-operative in Van Noi to give only the best-known example of safe vegetable production.) and are also in the peri-urban category.



At the same time, supermarkets also get their supplies from safe vegetable co-operatives outside Hanoi.

The quantitative importance of these different vegetables is partly known. Available data are shown in table 1.

**Table 1: Shares of different types of tomatoes and water morning glories on the Hanoi market**

*(in percentage of vegetable market volume in Hanoi and surrounding areas).*

Types of vegetables	Tomatoes	Water morning glories	All vegetables(including tomatoes and water morning glories)
Safe*	-	-	5%
Peri-urban**	35%	100%	50%
Chinese***	From 0 to 80% according to the season	-	
Da Lat***	Up to 15%	-	
Organic****	<0.1%	<0.1%	<0.1%
Supermarket†*****	-	-	2%

According to data provided by:

\* Moustier et al, 2003

\*\* Agricultural services of the City of Hanoi, quoted by Mai Thi Phuong Anh et al, 2003. In 2002, in Hanoi and outskirts production was 135,591 tons of vegetables of which 6,867 tons were tomatoes and 50,145 tons were water morning glories. Consumption was estimated by the same source as 264,591 tons for all vegetables; 19,427 tons of tomato and 48,245 tons of water morning glory.

\*\*\* Hoang Bang An et al. 2003

\*\*\*\*Hanoi Organics: sales made in 2003 at the Yen Noi and Tien Phuong co-operatives: 40,200 kg of vegetables of which 5,900 kg were water morning glories and 1,800 kg were tomatoes. It should be noted that the entire country only has 3 ha of organic vegetables, 2 ha of which are on the outskirts of Hanoi (according to Boun-Tieng Ly personal communication, MARD and Hanoi Organics)

\*\*\*\*\*Nguyen Thi Tan Loc, 2002

For more details, see Cadilhon (2004), De Bon (2003), Dini (2002), Hoang Bang An et al (2003), Moustier et al (2003), Nguyen Thi Tan Loc (2002).

## II. PROTOCOL

### Perceived quality of peri-urban vegetables

The first step is based on questions that we introduced in a survey undertaken by RIFAV within the context of SUSPER project in November 2003. This survey named "Quantitative assessment of consumption behaviour in Hanoi" was conducted in all seven districts of inner Hanoi and five districts of peri-urban Hanoi. 500 households has been randomly selected, using a multi-stage cluster sampling procedure define by GSO (General Statistic office).

Respondents were asked to choose in two given lists, the four main advantages of peri-urban vegetables and their four main defects. These lists (see annexe 2) have been built on the basis of previous survey (Bridier, 2000)

### Quality signs relative to tomato and water morning glory

In this second step, we have tried to find out what the consumer considers to be, in the case of tomatoes and water morning glories, the characteristics of a product of peri-urban origin, a Chinese product, a Da Lat product, a 'safe' product, an 'organic' product, and a product sold in supermarket. We have looked for what can be considered the attributes of each of these products, or, in other words, the characteristics of these products as they are perceived by the consumer.

In order to place these attributes in the context of product quality, we have also looked for attributes which consumers associate with a 'quality water morning glory' or a 'quality tomato'.

Data were collected using the associative method, through word association, as described by Moscovici et al, 2003: 376. The subjects are given one or several 'trigger words' and they say whatever comes into their minds.

We proceeded by pairs of trigger words, made up of the 14 combinations shown in table 2.

**Table 2: Inducing word pairs used in word association study**

Quality		Water morning glories
Peri-urban		Tomatoes
China		
Da Lat		
Safe		
Organic		
Supermarket		

In this way we asked consumers to describe using a list of words what, in their minds, was a water morning glory/tomato of quality, a safe water morning glory/tomato, a Da Lat water morning glory/tomato, etc...

The words associated with these concepts allowed us to build a corpus, which is to say a body of words associated to a trigger word pair. From these associations it is possible to come away with a picture of how the subjects perceive the products. That is to say that these associations inform us as to how the subjects see, but not as to what they do. They do not give us any information about consumer practices, or even whether the subjects consume these products. They make us know the meaning of such categories for the community of Hanoi consumers. Thus, we do not try to put in evidence differences among consumers, but we supposed on the opposite that when consumers speak together of these different kinds of vegetables, they use words which have a common meaning for this community, which is a condition for a dialogue (Darré, 1985). The third step, using focus groups, mentioned above, will allow us to analyse if the meaning of these categories varies among socio-economic groups.

### ***Study sample***

Building the corpus (14 corpuses for the 14 pairs of trigger words) was done by studies undertaken with 55 subjects. We had initially decided to only conduct these surveys at open marketplaces (35 surveys). But since many subjects had never heard of organic vegetables or even supermarket vegetables, we were forced to conduct 10 surveys each in supermarkets and at an 'organic' point of sale (see sample detail in annex 3).

All of the subjects were women, since in Vietnam they are responsible for the shopping. The small sample size does not allow us to compare the three consumer groups met at the three points of sale. We must draw attention, however, to the fact that since we included surveys in supermarkets and Hanoi Organics shops, we have over-represented this well-to-do section of the population in our survey.

### III. RESULTS

#### Peri-urban vegetables

The main advantages and defects of peri-urban vegetables quoted by the respondents are presented in the table 3 and 4.

**Table 3: Main advantages of peri-urban vegetables**

	Number of time this answer has been quoted	% of respondents	% of answers
Fresh	372	74.4%	37.8%
Tasty	187	37.4%	19.0%
No chemical residue	122	24.4%	12.4%
Not expensive	117	23.4%	11.9%
Good appearance	112	22.4%	11.4%
Tender	45	9.0%	4.6%
Not mashed	14	2.8%	1.4%
Nutritious	10	2.0%	1.0%
No biological contamination (germs, worms...)	1	0.2%	0.1%
Control	4	0.8%	0.4%
Total	984		100.0%

500 respondents, Hanoi, November 2003. Advantages to be quoted in a given list (4 max by respondent)

**Table 4: Main defects of peri-urban vegetables**

	number of time this answer has been quoted	% of respondents	% of answers
No control	225	45.0%	63.2%
Chemical residue	55	11.0%	15.4%
Bad appearance	40	8.0%	11.2%
Bad taste	18	3.6%	5.1%
Expensive	11	2.2%	3.1%
Not tender	3	0.6%	0.8%
Unclean, biological contamination	3	0.6%	0.8%
Not nutritious	1	0.2%	0.3%
Not fresh	0	0.0%	0.0%
Mashed	0	0.0%	0.0%
Total	356		

500 respondents, Hanoi, November 2003. Advantages to be quoted in a given list (4 max by respondent)

We must notice:

- Quoted advantages are much more numerous than defects (2,5 more).
- The main advantage of these vegetables is far ahead their freshness, quoted by 3/4 of respondents. Consumers then appreciate their taste (more than one third), their absence of chemical residue, their low price and their good appearance (1/4).
- The main defect is far ahead the absence of control on these products (nearly half the sample). Then come paradoxically far behind, the presence of chemical residues.

So respondents seem to be willing to have increased control, probably to control chemical residue.

But, if nearly half the sample complains of lack of control, for ¼ of respondents the absence of chemical residue is one advantage of peri-urban vegetables.

To understand this apparent contradiction, we must remember that part of our respondents is not only consumers there are also producers (our sample is composed of 110 farmers and 389 non-farmers). Table 3 and 4 show that there are some differences in the answers of these two groups.

Farmers gave more answers than non-farmers (2.5 qualities and 1.1 defects quoted by each farmer, and 1.8 and 0.6 by non-farmer). So we have to analyse the differences between these two sub-samples considering for each answer its importance regarding the total number of responses (number of time this response has been chosen/ total responses) and regarding the number of respondents (number of respondents who choose this answer/number of respondents).

We can notice that farmers are more likely to underline the absence of chemical residue than non-farmers. But we must also notice that farmers are numerous to underline the absence of controlled as an important defect.

**Table 5: Advantages of peri-urban vegetables for farmers and non-farmers**

Advantage	% of all respondents	% of farmer respondents	% farmers' responses	% of non farmer respondents	% non farmers' responses
Tender	9.0%	10.0%	3.9%	8.7%	4.8%
Tasty	37.4%	60.0%	23.6%	31.1%	17.2%
Good appearance	22.4%	8.2%	3.2%	26.5%	14.6%
Fresh	74.4%	84.5%	33.2%	71.7%	39.6%
Not mashed	2.8%	0.9%	0.4%	3.3%	1.8%
Nutritious	2.0%	1.8%	0.7%	2.1%	1.1%
No chemical residue	24.4%	42.7%	16.8%	19.3%	10.7%
No biological contamination (germ, worms)	0.2%	0.9%	0.4%	0.0%	0.0%
Good price	23.4%	44.5%	17.5%	17.5%	9.7%
Control	0.8%	0.9%	0.4%	0.8%	0.4%

sample of 110 farmers and 389 non farmers

**Table 6: Defects of peri-urban vegetables for farmers and non-farmers**

Defect	% of all respondents	% of farmer respondents	% of farmers' responses	% of non farmer respondents	% non farmers' responses
Not tender	0.6%	0.9%	0.8%	0.5%	0.9%
Not tasty	3.6%	6.4%	5.9%	2.8%	4.8%
Bad appearance	8.0%	20.9%	19.3%	4.4%	7.5%
Not fresh	0.0%	0.0%	0.0%	0.0%	0.0%
Mashed	0.0%	0.0%	0.0%	0.0%	0.0%
Not nutritious	0.2%	0.0%	0.0%	0.3%	0.4%
Chemical residues	11.0%	10.9%	10.1%	10.8%	18.4%
Biological contamination (germs, worms)	0.6%	1.8%	1.7%	0.3%	0.4%
Expensive	2.2%	6.4%	5.9%	1.0%	1.8%
No control	45.0%	60.9%	56.3%	38.6%	65.8%

*sample of 110 farmers and 389 non farmers*

## Tomato and water morning glory

The corpus associated with each pair of trigger words gives us a picture of the meaning of those trigger words. It is this meaning that we will present here. In each case we have regrouped the information into the following themes:

- the categories in which trigger word pairs are associated or opposed
- the associated intrinsic quality attributes, by which we mean the attributes directly linked to the product, such as colour, shape, taste...
- the associated extrinsic quality attributes, by which we mean those not directly linked to the product such as price and origin
- associations related to sanitary quality
- associations related to product quality consumer confidence

Comments made by the subjects along with their answers have also been taken into account to give their answers more meaning.

You will find in annex 4 the details of the 20 most often used associations for each trigger word pair.

It should be noted that the Da Lat water morning glory and Chinese water morning glory categories received very few reactions since these products are not available in Hanoi. For these pairs, all the results are in the annex.

## THE TOMATO

### *The quality tomato*

Quality tomatoes are associated with the categories 'Vietnamese tomato', 'Da Lat tomato', 'Van Noi tomato' (Van Noi is an agricultural co-operative producing safe vegetables in the peri-urban area of Hanoi), 'tomatoes sold in safe vegetable shops and supermarkets'.

It is opposed to the 'Chinese tomato' category.

Viewing the answers by theme allows us to understand the elements that make up a quality tomato (table 3).

**Table 7: Descriptions of a quality tomato**

Themes discussed	Frequency of associations	Content
Associated categories	20	Origin: Vietnam (6), not Chinese (6), Da Lat (1), Van Noi (1), Point of sale: safe vegetable shop (5), supermarket (1)
Pulp texture	36	Floury (17), firm/not crushed (15), a bit soft/not too hard (3), not much water (1)
Ripeness	33	Ripe (10) but not too ripe (2), naturally ripe (9), homogeneous (12)
Stem	25	Present (6), green (11), slender (7), not too green (1)
Shape	24	Big (6) but not too big (5), round (5), slightly elongated (4), a little flat (3), small (1)
Freshness	23	Fresh tomatoes (12) and fresh stems (11)
Colour of skin	25	Pink (9), red (8), homogeneous colour (4), no spots (4)
Seeds	15	Little (13), no seeds (1), non-green seeds (1)
Skin	11	Smooth (15), not too smooth (1), thin (3), thick (2)
Colour of pulp	6	Pink (4), red (2)
Sanitary quality	18	Naturally ripe (9), sold in safe vegetable shops (5), safe (3), unsprayed (1).
Other	5	Expensive (1), not very attractive (3), tastes good after being cooked (1).

A good tomato is one which is floury, firm with few seeds. It must be ripe and of homogeneous colour.

It must above all have ripened naturally. This remark is explained by the subjects as related to a product often used by farmers known as *dat den* (soil-lamp), which is also

often mentioned when speaking of a 'Chinese product'. This is a product which accelerates the maturation and colouring of tomatoes. An expert from the RIFAV (M. Mai pers. com.) confirmed for us the use in Vietnam of ethylene carbide to ripen bananas, tomatoes and persimmons. When it comes into contact with water it emits acetylene, a gas which is well known for – among others – its ability to ripen certain fruits (Lafon, 1998). This gas is often replaced by the smoke from incense sticks.

We have been unable to find any information on the legislation concerning the use of ethylene carbide or a study on any possible negative side effects to consumer health.

Freshness is an important element. A green stem is, according to the subjects, a sure sign of freshness and also indicates natural maturation.

If red colouring is appreciated, it is also suspect because it can indicate artificial maturation. In the same way, a tomato which is too big points to the use of growth stimulating chemicals. For these two reasons, it is best to choose a pink and smallish tomato.

Thus, the size and colour of a tomato are two attributes which create tension between the search for sanitary quality and visual quality.

The skin must be thin, although a minority prefer a thick skin. The difference may lie in the use of the tomato, be it for a salad or a sauce.

It should be noted that the taste quality was only mentioned by one subject who mentioned 'taste after cooking'.

It should also be noted that a starchy or floury texture is highly appreciated by Vietnamese consumers even though it is considered a defect in Europe (Fruits et Legumes, 1999).

Next to these attributes, which can be called intrinsic since they concern the product itself, are extrinsic attributes such as origin (Vietnamese vs. Chinese), point of sale (safe vegetable shops) and price (expensive).

The sanitary quality which most interests us has already been widely mentioned in such terms as 'ripened naturally' (9), 'sold in safe vegetable shops' (5), 'clean, safe' (3), 'without spraying' (1). This confirms (Bridier 2000, Figue 2003...) that health quality is an important component of product quality and is measured in terms of chemical product use.

### ***The Safe Tomato***

The 'an toan' tomato is associated by the subjects to those which are 'bought in supermarkets', 'bought from known sellers' or 'bought directly from the farmers'. It also means tomatoes bought in safe vegetable shops or in Hanoi Organic outlets. This is as opposed to 'tomatoes sold in the market'.



**Table 8: Description of a safe tomato**

Themes discussed	Frequency of associations	Contents
Associated categories	10	Supermarkets (3), producers (2), known people (2), organic or safe vegetable shops (3)
Positive intrinsic attributes	26	Tasty (4), fresh (4), pink (6), not crushed (4)
Negative intrinsic attributes	16	Not floury (3), small (4), hard (2), not beautiful (4), not fully ripe (3)
Sanitary quality	10	Not ripened with carbide (4), not sprayed (6)
Confidence	17	Reassured (10), uncertain (7)

A 'safe' tomato is characterised above all by confidence. This confidence is far from being assured since 'one can never be too sure'. For this reason the point of sale is often associated with this category: to be certain of these vegetables you can't buy them just anywhere. They can be found at supermarkets, shops, known sellers or producers. It is the seller who guarantees quality.

Their main quality is the non-use of chemical products for ripening or spraying. It should be noted that aspects linked to irrigation water quality – which is part of the specification sheet of safe vegetables in order to avoid biological contamination or the presence of heavy metals – are totally absent.

Above and beyond sanitary quality, a safe tomato combines the qualities of a good tomato such as freshness and colour, as well as negative aspects in its external appearance: small, unattractive, unevenly ripened, not floury enough...

### ***The Da Lat Tomato***

Da Lat tomatoes are no different from any other tomatoes for almost one quarter of the survey targets. For the others, Da Lat tomatoes have a longer shape. This is also what helps consumers spot Chinese tomatoes which they attempt to avoid, especially during the hot season when 80% of the tomatoes on the Hanoi market are from China and 15% are from Da Lat. Da Lat tomatoes are also considered to not taste as good as tomatoes from North Vietnam.

**Table 9: Description of Da Lat tomatoes**

Themes discussed	Frequency of associations	Contents
Categories	20	Indistinguishable (12), better than Chinese tomatoes (3), less tasty than Northern tomatoes (5)
Positive intrinsic attributes	36	Floury (12), pink (9), little or no seeds (6), not too big (2), not crushed (1), good taste (6)
Negative intrinsic attributes	29	Small (8), hard (6), red (4), stem not fresh (4), green inside (4), dry (3)
Extrinsic attributes	31	Expensive (11), available all year round (5), good for salads (3), long shape (12)
Sanitary quality	6	Confidence (5), artificially ripened (1)

The Da Lat tomato is appreciated for its floury texture and pink colour. Many think it is too small and firm, (even though this firmness is necessary if the tomato is to be chosen for long-distance transport).

Da Lat tomatoes also stand out for their high price which makes them a 'luxury for the people of the North', and the fact that they are available all year long.

### ***The Chinese tomato***

For half of those interrogated, the Chinese tomato is not to be found in Hanoi markets. They do not know them and do not knowingly buy them. Those who do know about Chinese tomatoes associate them with markets rather than supermarkets, where they are supposedly never sold, and distinguish them from tomatoes from North Vietnam and Da Lat tomatoes. Chinese tomatoes are considered less tasty than other varieties.

Even before taste is mentioned, Chinese tomatoes get bad marks for their sanitary qualities: it has been described as 'frightening' and its colour described as a 'frightening red'. Consumers are frightened by suspected chemical use, especially for ripening. These chemicals are responsible for the 'frightening' red colour which indicates artificial ripening: the tomato is a bright homogeneous red but not really ripe as can be seen from its taste or the colour of its seeds which are still green. It is interesting to note that Cambodians have the same opinion of Vietnamese tomatoes (Boun-Tieng Ly, per. com.). It is possible that these attributes are due to the variety, a possibility we were not able to verify during this study.

**Table 10: Description of Chinese tomatoes**

<b>Themes discussed</b>	<b>Frequency of associations</b>	<b>Content</b>
Presence	25	Don't know/don't buy (19), no difference (6)
Negative intrinsic attributes	29	Not tasty or less tasty (13), hard (6), very red (4), not floury (3), not very fresh (3)
Positive intrinsic attributes	22	Big (7), round (3), thin soft skin (3), floury (3), attractive (3), few seeds (3)
Sanitary quality	16	Toxic (8), frightening (8)

### ***The Organic Tomato***

This category is unknown to 29 out of 55 subjects.

Those who do know it say they trust it and it should be noted that nobody spontaneously mentions their lack of confidence, as is the case with 'an toan' tomatoes. Its main asset, other than its sanitary quality, is its freshness.

Other than this, it is not a popular tomato. The first reason for this is its appearance: a yellow colour, not red enough, small, with rough skin. Also, it is not homogeneously ripened, a defect which applies to individual tomatoes and entire batches. Some, however, consider this to be an advantage since it means that a batch can be consumed over time. Opinions differ as to its taste and texture.

Its sanitary quality and its firmness make it ideal for salads since organic tomatoes do not need to be cooked.

**Table 11: Description of organic tomatoes**

<b>Themes discussed</b>	<b>Frequency of associations</b>	<b>Contents</b>
Category	29	Unknown
Negative intrinsic attributes	27	Yellow (6), not red enough (3), unattractive (3), hard (3), bad conservation (3), not floury (3), small (2), not very tasty (2), not smooth (2)
Positive intrinsic attributes	14	Fresh (7), tasty (3), floury (2), not crushed (2)
Sanitary quality/confidence	21	Confidence (9), naturally ripened (6), no chemical input (3), clean (3)
Others	13	Good for salads (3), progressive maturing (3), watery (1), good quality (1), long shape (2), with clear-cut angles (1), more expensive (1), we can choose (1)

### Supermarket tomatoes

This category of tomato is associated with Vietnamese tomatoes, as opposed to Chinese tomatoes, as well as with co-operative produced tomatoes and safe tomatoes. It is seen as opposed to 'marketplace tomatoes'. For some, however, the only difference between open-marketplace and supermarket tomatoes is the way they are neatly presented and wrapped.

Despite some doubts, however, for many subjects the main attributes of these tomatoes is the confidence one may have in their sanitary quality.

To this must be added the following qualities: good taste, floury texture, nice colour. These qualities are linked to supermarkets' more rigorous tomato selection process. Safe and tasty, it is ideal for salads.

These tomatoes are expensive, however, and their freshness is open to debate: some consider them fresh while others say they are kept in refrigerated chambers or stands. In this way they can be kept longer but this contradicts the idea of freshness. Another problem with tomato sales in supermarkets is that they are often pre-wrapped, ruling out personal selection by the consumer.

**Table 12: Descriptions of supermarket tomatoes**

Themes discussed	Frequency of associations	Content
Category	16	Do not know because never bought (8), no difference (4), only the presentation is different (4)
Positive intrinsic attributes	29	Good taste (7), fresh (6), floury (6), no or few seeds (3), selected (3), green stems (2), pink (2)
Negative intrinsic attributes	14	Not very tasty (4), not fresh (4), small (3), hard (3)
Extrinsic attributes	13	Expensive (7), sold in an attractive location (3), impractical to buy (3)
Sanitary quality	16	Safe, clean (13), non-use of ripening chemicals (3)
Confidence	11	Confident (9), lack of confidence because they are kept for a long time (2)
Others	6	Good for salads (4), watery (2)

### **The 'peri-urban' tomato**

This term had to be explained in detail to the subjects of the study. Peri-urban tomatoes are those which are produced on the outskirts of Hanoi not including 'safe tomatoes'. For some subjects, the term encompassed that of 'Northern tomato' as opposed to tomatoes grown in the south of the country or 'Da Lat tomatoes' which are thought of as being less fresh, or even 'Chinese tomatoes' which are considered to be not as good. Peri-urban tomatoes are associated with common tomatoes found in the open-marketplace as opposed to supermarket tomatoes which are thought to be more expensive.

These tomatoes are not thought of as 'peri-urban', but are considered to be 'ordinary' tomatoes as compared to the other categories. They are easily identifiable by their shape: the quarters are less clearly lined, they are flat at the ends, some are round and others are long...

This is a tomato which has more qualities than the others: it is appreciated for its freshness, its taste, it is attractive in both size and colour, its skin is thin and smooth...and it is less expensive than Da Lat or supermarket tomatoes.

The main complaint is its health quality: it may have been artificially ripened. The question of confidence is still a relevant one.

This is a cooking tomato, possibly because of the health issue or its high water content.

**Table 13: Description of a peri-urban tomato**

<b>Themes discussed</b>	<b>Frequency of associations</b>	<b>Content</b>
Category	8	Not identifiable, don't know (6), Northern tomatoes (2)
Positive intrinsic qualities	47	Fresh (11), tasty (11), red ripe (6), floury (4), good/reasonable size (5), thin skin (3), tastes good after cooking (3), attractive (2) pink skin, not too red (2)
Negative intrinsic qualities	9	Not floury enough (3), too many seeds (3), not thoroughly ripened (3)
Extrinsic qualities	13	Cheap (6), easily available (4), naturally ripened (3)
Sanitary quality	11	Use of carbide (8), naturally ripened (3)
Confidence	3	Can be bought directly from the producer (2), problems of confidence (do not know if the product is safe) (1)
Others	8	Watery (3), for cooking (5)

## THE WATER MORNING GLORY

### *A quality water morning glory*

A quality water morning glory is primarily associated with a pond. This is in opposition to a 'dry rice-field water morning glory'.

It becomes clear from subjects' comments, that consumers identify several types of water morning glory in function of the way they are grown: in ponds, in flooded rice-fields and in dry rice-fields.

- *the pond water morning glory (rau ao or xo moi)* is planted by cuttings. There are many cuts in the process. The first cut produces a much appreciated 'mam' water morning glory. It is easy to spot thanks to its long stems, its red-purple colour and its small leaves. The following cuts produce a whiter stemmed water morning glory. The pond water morning glory is considered to be 'tender', the stems are brittle and stay crunchy after being cooked. The most famous are those from the Ngoc Ha quarter in Hanoi due to the fact that the Ngoc Ha ponds have only recently been set up for agriculture. Pond water morning glories are sold in a large bundle and are twice as expensive as so-called river water morning glory. The 'mam' variety is four times more expensive.
- *the flooded rice-field water morning glory*: its stems are white and its leaves are pale. Generally less appreciated than pond water morning glory, although some prefer it because it is thought to be crunchier.
- *Dry rice-field or garden water morning glory*: not very appreciated. It is sown, and not cut. It is considered to be of poor quality.

We can see that taste is the main factor in this classification. Sanitary considerations were often mentioned, although it was impossible to link these considerations to any one category of water morning glory. This consideration touches on the cleanliness of the plant, which is an ambiguous remark at best, the non-use of pesticides, the sale in safe vegetable shops and the absence of intoxication risks.

Opinions on the best colour are divided. This is due to the great variety of water morning glories which exist, as we have seen above. Long, slender and crunchy stems are, however, universally appreciated.

The attribute 'young, but not too young' has been mentioned several times and it deserves some explanation. Consumers appreciate young produce because they are tender. They are wary of them, however: they could have been treated with 'chemical products to stimulate growth'. Exploratory research on different products in Hanoi marketplaces exposed us to the same sort of comments by pork salesgirls, who said they stayed away from pigs which grew too quickly (high weight/age ratio) since this meant that the animals' growth was stimulated chemically.

Also, stems and leaves which are too green are suspect and not overly appreciated because they point to a water morning glory which is 'too old'.

Table 14: Description of a water morning glory of good quality

Themes discussed	Frequency of associations	Content
Categories	40	Pond water morning glory (15), <i>xo moi</i> (11), <i>mam</i> (3), flooded (3) clean vegetable shops (5), supermarket (2), from Ngoc Ha (1)
Sanitary quality	17	Clean (4), sold in clean vegetable shops (5), non-toxic (3), no insecticide (6)
Colour	37	Green leaves (13), but not too green (4), white stems (7), with a touch of purple (5), or even green (3), but not too green (5)
Shape	19	Slender stems (13), long stems (8)
Texture	19	Before cooking: fragile stems (6); after cooking: crunchy stems (4), tender (6), not viscous
Other	26	Clear cooking water (6), young (6) but not too young (10), not very attractive (4)

It should be noted that in the Hanoi Organics shop, point of sale for organic vegetables, buyers use another water morning glory classification, based on colour and not production methods:

- *the violet water morning glory*: thick and crunchy stems. It can be from dry or flooded agriculture. This water morning glory is best boiled, which is the most common way to prepare them (other ways are to sauté them or eat them raw. In the later case, the stems are thinly sliced long-ways);
- *the white water morning glory*: we must distinguish the common white water morning glory from the Thai water morning glory. The common white water morning glory is grown on dry land. Its stems are shorter and the leaves are longer than those of the violet water morning glory. It is also more tender. The Thai water morning glory is also grown on dry land. It is not very appreciated since it is not crunchy after being cooked and has too many leaves. Also, the stems have ‘thorns’.

It would be interesting to compare these categories to those used by farmers and agronomists.

### **A safe water morning glory**

A safe water morning glory is associated by some people with safe vegetable shops, known sales people and supermarkets. These associations point to the importance of the sales person or point of sale to guarantee the quality of a product of which people are generally wary.

The 'safe' qualification is based upon the low level of pesticides and growth stimulants, although the product usually suffers in its visual aspects and taste: the safe water morning glory is old, unattractive, hard...

**Table 15: Description of a safe water morning glory**

Themes discussed	Frequency of associations	Content
Categories	14	Safe vegetable shop (4), known salespeople (4), supermarkets (4), pond (2)
Negative intrinsic attributes	24	Old (9), unattractive (9), hard (4), not tasty (2)
Positive intrinsic attributes	4	Crunchy (2), tasty (1) long stems (1)
Sanitary quality	5	No or little insecticide (5)
Confidence	13	No confidence (9), reassured (4)

### ***The organic water morning glory***

The organic water morning glory is unknown in very much the same way. For those who do know it, it inspires more confidence than the safe water morning glory. Its first attribute is the presumed absence of chemical products. As in the case of safe tomatoes, however, this sanitary quality is assured at the expense of other quality attributes: the water morning glories are old, unattractive and not very tasty.

**Table 16: Description of an organic water morning glory**

Themes discussed	Frequency of associations	Content
Categories	49	Non-existent (39), sold in shops (6) as opposed to sold in the market (4)
Negative intrinsic attributes	12	Old (4), ugly (2), not tasty (4), not crunchy (2), too many leaves and stems too thick...
Positive intrinsic attributes	2	Slender stems (1), tasty (1)
Confidence	17	Reassured (10), no spraying (5), good for the health (2)

### ***The supermarket water morning glory***

This category is associated by some to peri-urban vegetables and to Van Noi Co-operative (on the outskirts of Hanoi) vegetables as opposed to open-market vegetables. For many subjects of the study, however, the main difference with open-marketplace vegetables is their presentation.

Their main quality is the confidence supermarkets inspire in the sanitary quality of these products. This quality is limited to the absence of chemical products. Here, and to a



larger extent than for supermarket vegetables, this quality is assured at the expense of other quality elements (old, ugly, not tasty, hard).

The same criticisms given to supermarket tomatoes also come up: not fresh, the client cannot choose, expensive.

**Table 17: Description of supermarket water morning glories**

Themes discussed	Frequency of associations	Content
Categories	12	No difference (12)
Negative intrinsic attributes	22	Old (8), unattractive (5), not very tasty (3), small stems (2), hard (2)
Positive intrinsic attributes	4	Small leaves (2), uncrushed (2)
Confidence	19	Reassured/safe (16), little confidence (3)
Others	13	Expensive (4), green (3), not fresh (2), not practical, one cannot choose (2)

### ***The peri-urban water morning glory***

This is a vague category for the study subjects. This is due to the fact that almost all water morning glory consumed in Hanoi is produced in the urban and peri-urban zones of the capital. For this reason, the geographic origin is not a relevant or useful question for consumers. This water morning glory is associated with a lake water morning glory and is largely appreciated for being young and tender.

There are, however, some negative aspects, the largest being the lack of consumer confidence in plant treatment and the fear of intoxication.

**Table 18: Description of a peri-urban water morning glory**

Themes discussed	Frequency of associations	Content
Categories	20	No difference (12), lake water morning glory (8)
Positive intrinsic attributes	34	Tasty (16), young (10), tender (3), slender stems (3), clear cooking water (2)
Negative intrinsic attributes	2	Old (1), viscous (1)
Confidence	9	Little confidence (9)
Others	10	Must be soaked before cooking (4), easy to buy (2), very green (2), a little green (2)

## IV. DISCUSSION

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This study allowed us to understand the following points:

### ***The categorisation of vegetables***

Making categories and setting up a classification system is one of the key activities of human thought. Each social group has its own way of classifying and relating to objects. This relationship teaches us much about how that group perceives an object. To give an example from Darre (1985), a leek for a market gardener is characterised by such attributes as its resistance or fragility, its growth cycle, the amount of work needed to grow it...For the housewife its an inexpensive winter vegetable, which is good in soups and salads. For the botanist it belongs to the liliaceae family and is associated with garlic and asparagus. In the same way, a good tomato or a quality water morning glory will not have the same attributes, and will not be in the same categories for the agronomist, the farmer or the consumer.

In the case of tomatoes, we have seen that the point of sale and the salesperson are important criteria of differentiation. The classification by geographic origin (Da Lat, China...) as suggested by our questions is pertinent and it did not pose a major problem to our study subjects, other than the often misunderstood peri-urban category.

In the case of water morning glories, point of sale and salespersons are also important, but geographic areas are less so, due to the fact that there is a smaller diversity in water morning glory origins. On the other hand, production methods, such as ponds, irrigated rice paddies and rain rice paddies are an important differentiation criterion.

The importance given to point of sale and salesperson, as a sign of extrinsic quality (which is to say not directly linked with the product itself, as is the case for colour or firmness for example) allows us to understand why salespeople do not consider it important to post other information: we have noticed that salespeople in Hom market sell 'safe' vegetables but do not advertise the fact since it is obvious for their clients (P. Moustier, comm. pers). We were also able to note that even in the midst of the avian flu crisis, poultry sellers did not post the certificates they had received from the Health Services. These signs (veterinary stamps, 'safe vegetable' certification...) are not as credible for the consumer as the salesperson's personal word. This trust has an important place in Vietnamese trade. It should be noted that one of the first steps taken by the Vietnamese health authorities during the recent avian flu crisis was to make wholesale poultry vendors sign a promise not to sell sick animals.

It is also interesting to note what the survey subject did not say and the classification traits they did not use: in particular they did not speak of varieties, with the exception of big or cherry tomatoes. It would be interesting on the other hand to compare their perceptions of tomatoes from China, Da Lat and Hanoi with the characteristics of the varieties grown in each of these regions.

### **Sought after quality attributes**

- The Hanoi consumer appreciates big, well-ripened tomatoes which are firm, pinkish-red and sold with the stem. They must be floury. Freshness is important and the presence of a fresh green stem indicates this. They shouldn't have too many seeds and their skin must be smooth.
- A good water morning glory has long, slender and white or violet stems. There shouldn't be too many leaves in relation to the volume of stems and they should be green and small. The stems must remain crunchy after cooking and the cooking water must stay clear. Pond water morning glories are most especially appreciated.
- For both tomatoes and water morning glories the sanitary aspect is preoccupying. The most important concerns are the use of chemicals in the production process and, above all, for the ripening of tomatoes.
- Nutritional quality is never mentioned when comparing vegetables. We know from elsewhere (Figuié, 2003), however, that vegetables in general have a positive dietetic image in the eyes of Hanoi consumers.

### **Product and quality identification**

- The Da Lat tomato is recognisable by its long shape. The Hanoi tomato has sharp angles.
- Consumers say they can easily recognise pond water morning glories by their long, slender, white or violet stems.
- Confidence varies when it comes to safe or organic products. One often hears the expression, 'you can never know for sure' when talking about safe vegetables. Organic vegetables, on the other hand, are trusted by consumers.
- Consumers judge Chinese products severely. They get low marks for questions of health – especially when it comes to tomatoes – and for questions of appearance and taste when it comes to water morning glories (see annex). This difference is probably due to the fact that subjects consider Chinese water morning glories to be a thing of the past. Their memories, therefore, belong to a time when there was less fear of chemical intoxication.
- Safe and organic vegetables are not appreciated for their physical appearance. They are considered to be 'old' and 'ugly'. It should be noted here that old is not the opposite of fresh. A product's age refers to how long it took to grow whereas freshness refers to the time between the harvest and the sale.
- As opposed to safe and organic vegetables, peri-urban vegetables are associated with daily consumption. They have a good quality image, with the notable exception of their health quality which, while preoccupying, is still higher than that of Chinese vegetables.
- Vegetables found in supermarkets have struck a balance between health and other quality indicators. In the case of health quality reliability they come in second, just after organic vegetables. This is to say that they are considered even healthier than 'safe' vegetables which are also sold in supermarkets. They come in second position for other aspects of quality as well, just after peri-urban vegetables. They are also characterised by their high price.

The perception of these different types of vegetables can be resumed in a diagram showing health quality on one axis and other quality attributes on another axis.

**Diagram 1: Quality attributes of tomato**

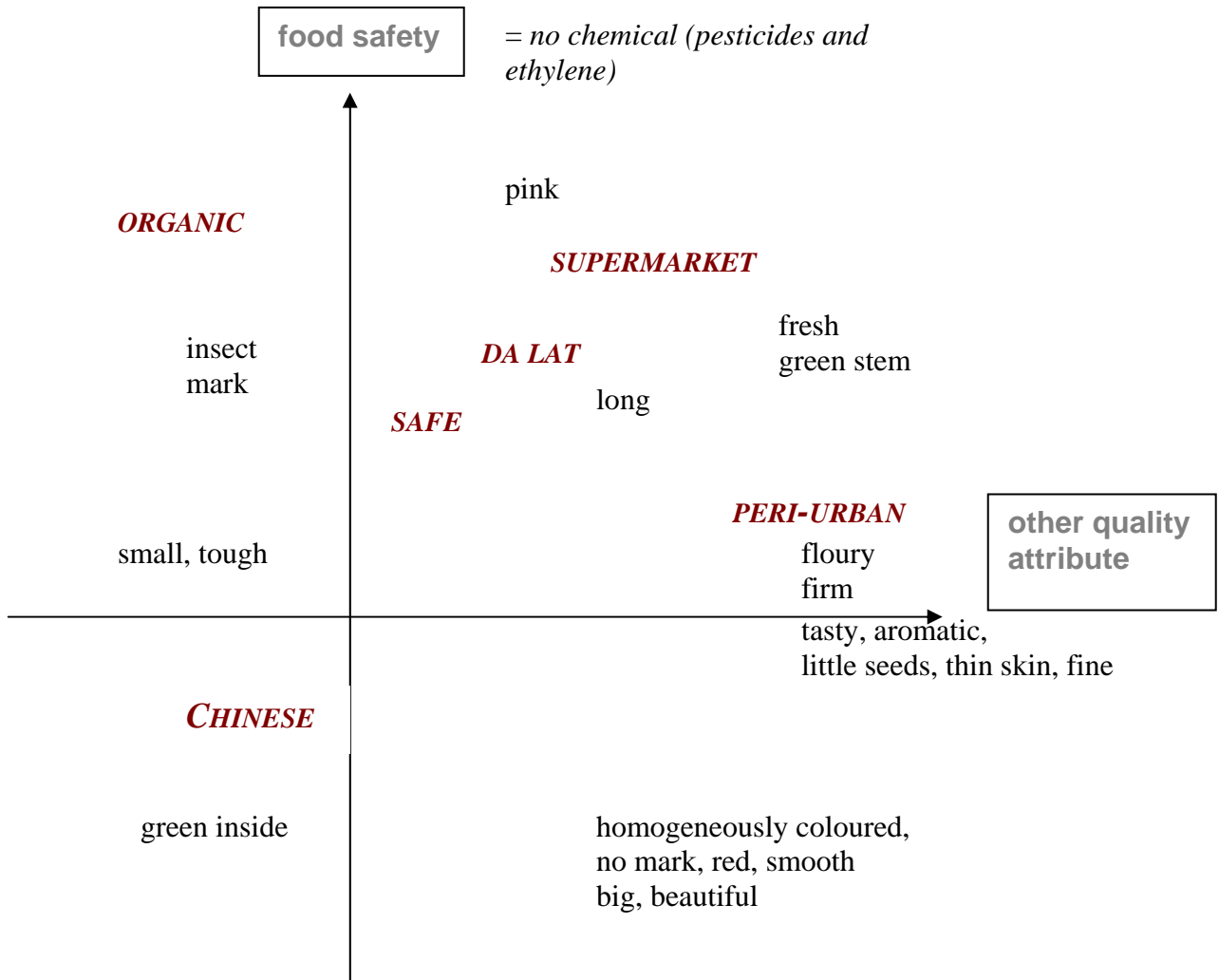
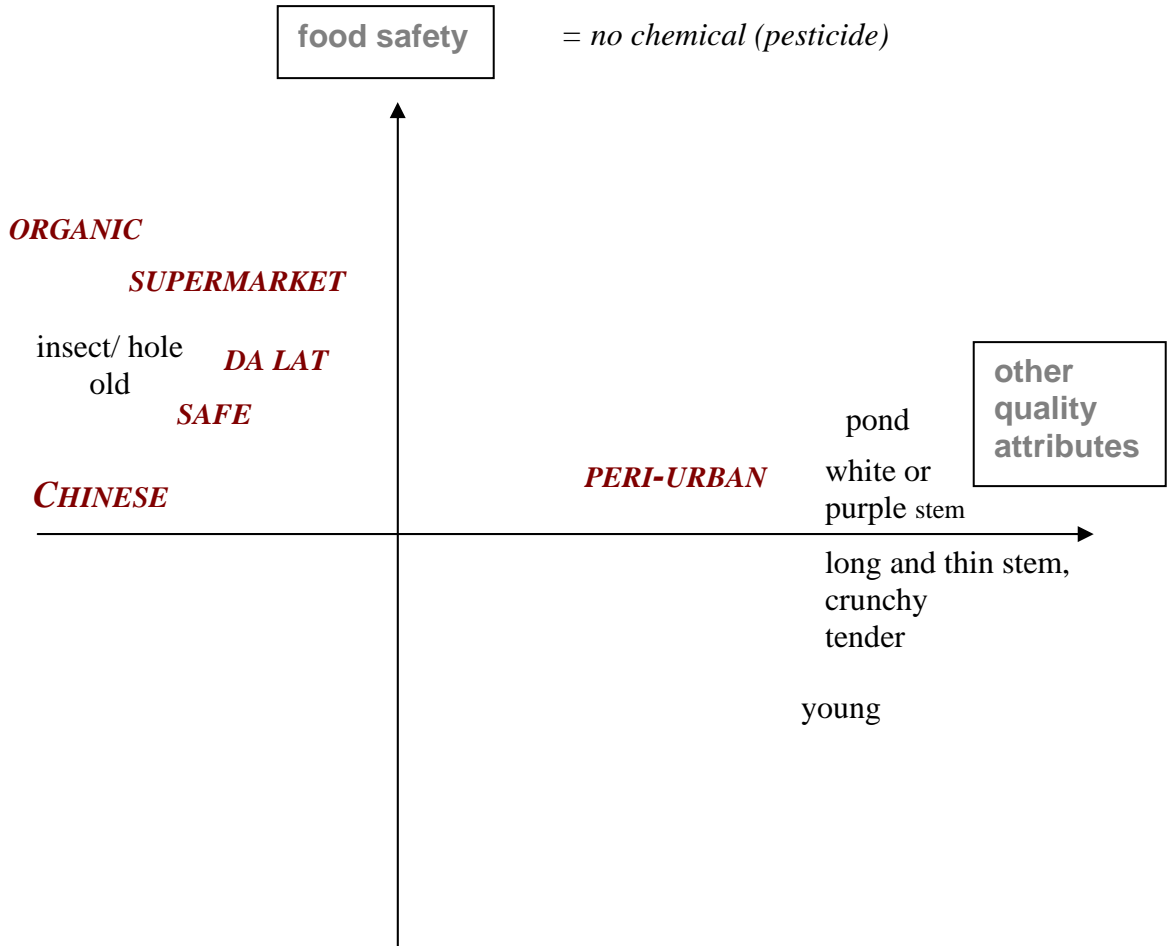


Diagram 2: Quality attributes of water morning



Diagrams 1 and 2 give a two-dimensional representation of safety on one hand and other aspects of quality on the other, as they have been expressed by consumers. These diagrams should be interpreted in the following way:

- An attribute which is close to the horizontal axis (that of non-health quality) and to the right of that axis is an attribute which is neutral from a food safety point of view but which contributes to other quality aspects, such as appearance and taste. For the tomato, firmness would be a good example of this.
- An attribute such as red colour, on the other hand, is negative from the food safety aspect but positive from other quality aspects.
- Insect holes may be positive in view of food safety but are negative attributes for other quality aspects.
- Green seeds are perceived as negative on both dimensions.

## V. CONCLUSIONS

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These results lead to different conclusions.

We can first clearly answer that peri-urban vegetables are well-perceived by Hanoi consumers. Freshness is clearly their main advantage. But Consumers are sensitive to food safety quality. When they describe product quality, safety is an integral part of that description. It is, however, not easy to judge safety: how can a consumer evaluate the quantity of pesticide residue in the vegetables she buys?

### **Confidence**

For this the consumer can trust information given on the growth process by such labels as 'organic vegetables' or 'safe vegetables'. In this case we refer to **attributes of credence** (Nelson, 1970). In the case of organic vegetables sold in Hanoi Organics shops, the consumer puts her trust in the information provided. This is much less true in the case of 'safe vegetables'. The consumer can also trust information provided by the salesperson. This is what happens when she speaks to her usual market seller with whom she has a long-established trusting relationship. The supermarket is thus seen as a point of sale for those who have no one to trust, and one survey subject told us: 'If you don't know anyone, go to the supermarket.' It should be noted, however, that according to ongoing research (M. Truyen, pers. com.) even supermarket staff have a role to play in the trust given by consumers.

### **The buyer's experience**

For some consumers, as one of them said, 'to buy we only have our eyes' or 'it's a question of experience': in other words the consumer can only trust herself. Her buying experience lets her build her own quality indicators, known as **proxis** (Nelson, op. cit.). A tomato which is too red should be avoided, even if this colour is appreciated by consumers, because this – or the absence of a stem – can indicate ripening chemicals. In the same way a tomato which is too big or a water morning glory which is too young can indicate that growth stimulants and chemical fertilisers were used. In relation to this one subject said, 'Supermarkets are for those who do not know'. The supermarket is seen as a point of sale where products have already been selected ('there was a selection' 'they were selected'). Supermarket vegetables are more expensive, and this is the price the consumer pays for her ignorance.

It would be interesting to compare these proxis with expert opinions. The presence of a peduncle on a tomato as a proxis of freshness is pertinent. The fact of the matter is that tomatoes cannot be tray wrapped it is best to take the 'stems' off so they will not pierce other tomatoes during transport. Therefore, attractive tomatoes with their peduncles intact are tomatoes which have not travelled, and so possibly fresh. On the other hand, the presence of insect holes may prove moderate pesticide use, but it can prove the very

opposite: a producer may have used too little pesticide during a first spraying then tried to 'catch up' later on by using massive chemical doses. This seems to happen quite a bit and in this case pesticide residue levels are way above accepted norms (Boun-Tieng Ly, pers. com.).

### ***The consequence for sales***

Supermarkets have the trust of consumers who consider that most vegetables sold there are safe, or at least of good quality. Do supermarkets deserve this trust? Supermarkets rarely post produce origin. Where do they get their tomatoes during the hot season? Do we never find, for example, the much avoided Chinese tomato in supermarkets? In the interest of consumers and quality-conscious producers alike, supermarkets should show the geographic origins of their produce more clearly. Since 1999, a law (decision 178/1999) impose for every marketed foodstuff a label mentioning the ingredients, the date of production and expiration, the name and address of producer or factory, the weight and mode of use.

In order to adapt themselves to consumer demands, supermarkets should let the possibility for shoppers to choose vegetables one by one.

The question of freshness is ambiguous since refrigeration is considered as a way to fool consumers. Supermarkets should post the date or frequency of their deliveries. Due to the fact that personal relationships are very important, supermarkets should have a steady and well-trained sales team, which is rarely the case.

The credibility of organic or safe products is thanks to their unattractive appearance. These vegetables must improve their visual quality while maintaining (in the case of safe vegetables) their credibility. This could be done with another quality indicator, such as supermarket sales. In order to make sure that 'normal' products do not cash in on this, they must work at developing their own label. Selling products in a closed bag in supermarkets is a stage in this process, but it goes against consumer demands to choose their vegetables one by one.

The elitist sales of safe products in supermarkets only should be curbed. The goal of the authorities, after all, is to spread the consumption of safe vegetables to the entire population. This will only happen if producers can be convinced to broaden their credibility base to networks beyond supermarkets.

Peri-urban vegetables have a good image they can take advantage of. Their main defect is their health quality. It is easy to see that tomatoes labelled 'naturally ripened' would be a success with consumers.

Chinese origins are often hidden. During one of our visits to a market, the salespeople told us they never sold Chinese tomatoes, which is hard to believe. Another salesgirl eventually admitted that her Da Lat tomatoes were, in fact, from China. Do Chinese tomatoes really deserve their bad reputation? If so, then the authorities should control the quality of Chinese imports.



### **Risk perception**

Fear of chemicals is a major factor in considering health risks as perceived by consumers. Is ethylene carbine use really dangerous? Either the consumer has taken the danger out of all proportion and needs to be reassured, or the use of this product is really dangerous and must be curtailed. Whatever the case may be, this fear must be addressed.

On the other hand, should consumers not be even more afraid of water morning glories grown in ponds right in the centre of Hanoi? Should they not be concerned about the microbiological quality of these products and the possible presence of heavy metals? Are consumers not closing their eyes to a real danger?

We have also been able to confirm the fact that buyers are not overly concerned by biological quality when they go shopping (Figuie, 2003). This can be explained by a remark made by a study subject: "It's normal that vegetables with earth on them are dirty. They just have to be washed." Microbiological quality is, therefore, not a consideration at the market but it is important at the table, as we can see by different vegetable washing and soaking practices. The consumer does not expect the seller to deliver a clean product: she makes this her business.

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**ANNEXES**


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**Appendix 1: Consumption of individual major vegetables in urban and peri-urban Hanoi (2002)**

(g/pers/day).	All Hanoi	Urban	Peri-urban
Cabbage	56.8	59.5	54.2
Kangkong	46.9	46.6	47.2
Pakcchoi	30.5	25.9	35.1
Kolrabi	23.9	26.1	21.7
Tomato	18.8	21.2	16.5
Mustard	15.3	14.5	16.2
Garland Chrysanthemum	7.5	8.0	7.0
Alliums	8.6	10.2	7.0
French bean	9.7	14.8	4.6
Pumpkin	0.5	0.6	0.4
Other vegetables	39.3	41.3	37.3

Households consumption survey conducted by RIFAV in 2002, 800 households

Source: Mai Thi Phuong Anh, Hoang Lan Anh, To Thi Thu Ha, Mubarik Ali, 2003. Urban and Peri-urban agriculture in Hanoi: resources and opportunities for food production. Project Report, SUSPER project, Hanoi.

## Appendix 2: Peri-urban vegetables

### Questions addressed to Hanoian consumers (step 1)

#### 1. Select the 4 main advantages of peri-urban vegetables (4 maximum)

ADVANTAGES	PERI-URBAN VEGETABLES
Tender	
Tasty	
Good appearance	
Fresh	
Not mashed	
Nutritious	
No chemical residue	
No biological contamination (germ, worms)	
Good price	
Control	

#### 2 Select the 4 main defects of peri-urban vegetables

DEFECT/	PERI-URBAN VEGETABLES
Not tender	
Not tasty	
Bad appearance	
Not fresh	
Mashed	
Not nutritious	
Chemical residues	
Biological contamination (germs, worms)	
Expensive	
No control	

## ANNEXE 3. Sample (step 2) for the survey Tomato/water morning glory

Survey undertaken in Hanoi, from October to December 2003

55 in-depth interviews in 4 places

- interviews 1 to 14: open-market 19/12, Hai Ba Trung, Hanoi
- interviews 15 to 35 : open-market Ngoc Ha, Ba Dinh, Hanoi
- interviews 36 to 45 : supermarket (mini-market) Intimex, n°22-23 Le Thai To, Hoan Kiem, Hanoi
- interviews 46 to 55 : shop Hanoi organic, Nguyen Hong, Dong Da , Hanoi

**Appendix 4 : Corpus built from trigger words****Tableau 1: Associations à partir du couple tomate/qualité**

	Fréquence
Beaucoup de farine	17
Tiges présentes vertes / fraîches / pas flétries	17
Ne pas être écrasée	15
Peu ou pas de graines	14
Maturation homogène	12
Fruits frais	12
Maturation naturelle / pas d'utilisation de carbure pour faire mûrir	9
Roses claires	9
Peau rouge	8
Mûre	7
Tiges fines	7
Fruits de grand format	6
Tomates vietnamiennes / pas tomates chinoises	6
Fruits ronds	5
Fruits pas trop gros	5
Vendue dans les magasins de légumes propres	5
Peau lisse	5
Plus chère	5
Un peu allongée	4
Chair rose	4

**Tableau 2: Associations à partir du couple tomate/saine**

	Fréquence
Plus de confiance /assurée /rassurante	10
On ne peut être sûr qu'elles sont saines	7
Petite, pas trop grosse	7
Pas ou moins de pulvérisation	6
Rose, rose fade mais pas rouge, pas rouge foncé	6
Frais	4
Pas mûrie au carbure	4
Plus cher	4
Pas très belles	4
Bonne , meilleure	4
Peu de farine	3
Maturation non homogène (taches jaunes et vertes)	3
Ne pas pouvoir choisir car elles sont mises dans les sacs.	3
Acheter dans les supermarchés	3
Plus lisse (que les tomates normales)	3
Ne pas être écrasée	3
Pas très bonne	2
plus dure	2
a manger comme salade	2
à acheter auprès de personnes connues	2
à acheter auprès des producteurs	2

**Tableau 3: Associations à partir du couple tomate/Da Lat**

	<b>Fréquence</b>
On ne peut la distinguer	14
Allongée	12
Il y a beaucoup de farines	12
Plus chère	12
Rose / rose homogène (peau claire lisse)	9
Fruits de petite taille	8
Bonne, parfumée	6
Peu ou pas de graines	6
Fruits durs	6
Pas aussi bonnes que les tomates du Nord	5
Il y en a toute l'année	5
Saine, plus confiance	5
Plus rouge / rouge, rose	4
Pas frais, il n'y a plus de tige	4
Verte à l'intérieur, plus verte, graine verte	4
Manger comme salade c'est mieux que la cuisson	3
Sèche (pas juteuse)	3
Meilleure que la tomates chinoise	3
Fruit gros mais pas trop	2
Mûrie artificiellement	1
Pas écrasée	1

**Tableau 4: Associations à partir du couple tomate/chinoise**

	Fréquence
Ne sait pas, n'en achète jamais	19
Pas bonne, moins bonne que tomates vietnamienne (Nord, Da Lat)	13
Médicaments, produits toxiques	8
Effrayante (très rouge, très lisse)	8
Grand format / tomate hybride	7
Pas de différence	6
Fruits durs	6
Très rouge	4
Fruits ronds	3
Peau fine et lisse	3
Beaucoup de farines	3
Pas beaucoup de farines / peu de farines	3
Belle apparence / plus belle	3
Peu de graines	3
Beaucoup d'eau	3
Pas très fraîche	2
Reconnaissable	1
Un peu plat	1
Hors saison	1
Vendu au marché	1
Couleur naturelle	1

**Tableau 5: Associations à partir du couple tomate/biologique**

	Fréquence
Ne connaît pas	29
Confiance / assurée / rassurante	9
Fraîche, tige verte et fraîche	7
Pas de produits chimiques, mûrie naturellement	6
Jaune, ou jaune avec tâches rouges maturation hétérogène	6
Pas assez rouge	3
Pas très belle	3
Un peu dures	3
Tomates "propres"	3
Mauvaise conservation, ne pas pouvoir les garder pour longtemps	3
Peu de farines	3
Mure progressivement, pour en manger progressivement	3
Pour manger comme salade	3
Bon goût	3
Fruits de petite taille	2
Fruits allongés	2
Pas très bonne	2
Beaucoup de farines	2
Plus chère	1
Avec de l'eau	1

**Tableau 6: Associations à partir du couple tomate/supermarché**

	Fréquence
Saine, propre, sans pesticides	13
Confiance / assurée / rassurante	9
Ne connaît pas, n'en achète pas	8
Plus chère	7
Meilleure, parfumée	7
Plus fraîche	6
Beaucoup de farines	6
Pas de différence	5
Peut être mangée comme salade	4
Pas très bonne / pas aussi bonne que les tomates de marché	4
Tomates gardées en chambre froide, pas fraîche, gardé longtemps sans s'abîmer	4
Fruits de petite taille , pas très gros	3
Fruits durs	3
Pas ou peu de graines	3
Etre vendue dans un bel endroit / élégant / étalage attirant	3
Tomates de première classe, sélectionnées	3
C'est pas pratique pour les courses et on ne peut choisir	3
Tiges vertes	2
Mûre rose	2
Tomates vietnamiennes	2

**Tableau 7: Associations à partir du couple tomate/périurbain**

	Fréquence
Fraîche, plus fraîche que celle de Da Lat, tiges fraîches	11
Bonne, parfumée après cuisson	10
Utiliser des produits pour faire mur	8
Pas distinguable	6
Bon marché, moins cher que Da Lat et supermarché	6
Mure rouge	6
Pour la cuisson	5
Beaucoup d'eau	4
Disponible sur les marchés / facile à acheter / pratique pour les courses	4
Beaucoup de farines	4
Peu de farines	3
Beaucoup de graines	3
Fruits de grande taille	3
Peau mince	3
Mûre naturellement /	3
Maturation hétérogène / taches jaunes et roses	2
Les quartiers sont très nets	2
Fruits de taille raisonnable	2
Tomate du Nord	2
A acheter auprès de vendeuses connues ou des producteurs	2
Belle	2
Peau rose, pas très rouge	2



**Tableau 8: Associations à partir du couple liseron/qualité**

	Fréquence
liseron d'eau d'étang, de mare	15
tiges fines	13
couleur verte (après cuisson aussi)	13
liseron xo moi	11
pas trop jeune, pas forcément jeune	10
liseron d'eau "propre", vendus dans magasin de légumes propres	9
pas d'insecticide, pas toxique	8
tiges longues	8
tiges blanches	7
Jeune	6
légume tendre	6
l'eau de cuisson reste transparente	6
tiges cassantes	6
tiges un peu violettes	5
pas trop beau	4
tiges craquantes après cuisson	4
les feuilles ne sont pas trop vertes	4
bon au goût	3
Le légume n'est pas visqueux	3
Cher	3

**Tableau 9: Associations à partir du couple liseron/sain**

	Fréquence
Vieux	9
moche / pas très jeune	9
incertitude : on ne sait pas vraiment s'il est sain	9
Acheter des légumes propres, en acheter dans les magasin de légumes propres	7
pas ou moins d'insecticides ni stimulant	5
Acheter auprès des personnes connues (vendeuses fixes)	4
Légumes dans les supermarchés	4
Rassurant / confiance / assuré	4
à acheter dans les magasins légumes propres	4
dur, pas tendre	4
à tremper avant la cuisson	3
avec des insectes	3
mauvais goût	2
légume d'étang	2
non croquants	2
pas très vert	1
tiges longues	1
Couleur un peu violette	1
Couleur un peu blanche	1
Bon	1

**Tableau 10: Associations à partir du couple liseron/Da Lat**

Ce liseron n'est pas identifié par les consommateurs: la majorité des enquêtés ne le connaissent pas, et n'en ont jamais vu. Quelques-uns s'expriment de façon négative sur ce produit : il n'est pas aussi bon que le liseron du Nord.

	Fréquence
ne connaît pas, n'en achète pas	45
pas aussi bon que le liseron d'eau du Nord	6
tiges fines	3
Vieux	2
sec / pas tendre	2
tiges longues	2
feuilles de petite taille	2
eau de cuisson non transparente, rose	2
liseron d'eau sec, de jardin	2
il y a du liseron d'eau hors – saison	1
plus cher	1
tiges courtes	1
croquant (après la cuisson)	1
les tiges sont grimpantes	1
couleur un peu violette	1
beaucoup de tiges/feuilles	1
couleur vert foncé	1

**Tableau 11 : Associations à partir du couple liseron/biologique**

	Fréquence
ne sait pas	39
plus de confiance / plus sain / plus rassurant / qualité assurée / ne pas avoir peur d'intoxications	11
vendu dans les magasins de légumes propres	6
pas de pulvérisation des produits stimulants / pas de produits de traitement / pas de produit chimique	5
plus vieux / pas aussi jeune que le légume de marché	4
insectes sur les feuilles	4
pas beau / l'apparence plus moche	2
très bon / bon pour la santé	2
pas bon, pas sucré, amer, âpre (chat)	4
tiges grosses (légume « rouge » / violet)	1
beaucoup de feuilles (légume blanc)	1
l'eau (le bouillon) n'est pas vert	1
pas croquant, mou	2
plus cher	1
manger comme salade (en couper)	1
tiges de petite taille	1
tiges de couleur un peu violette	1
tiges fines	1

**Tableau 12: Associations à partir du couple liseron/Chine**

Le liseron chinois est peu connu. Une ambiguïté s'est révélée dans notre enquête: notre question était-elle relative aux variétés chinoises de liseron cultivées au Vietnam ou aux liserons importés de Chine? Nombreux sont ceux qui nous ont affirmé que l'importation de liseron de Chine appartient au passé (ce qu'il serait intéressant de vérifier). Ce liseron nous a été décrit comme blanc, planté en graines et non inondé. L'image globale est négative, mais le reproche n'est pas la qualité sanitaire et la chimiophobie déjà évoquée. On lui reproche surtout son mauvais goût : il est fade voire amer. De plus il est visqueux et ses tiges sont grosses. Peut être s'agit-il de l'évocation d'un souvenir d'une époque où la crainte des produits chimiques n'était pas encore présente.

	Fréquence
ne connaît pas, absent,...	32
pas bon (fade, amer)	15
tiges blanches, feuilles blanches	7
variété chinoise	5
obtenu par semis	5
visqueux	5
grosses tiges	4
croissance rapide	3
tiges croquantes	2
feuilles de petite taille	1
feuilles dures	1
feuilles allongées	1
feuilles de grand format	1
tiges longues	1
pour nourrir des porcs, des poulets	1
ramassé sans sélection	1

**Tableau 13 : Associations à partir du couple liseron/supermarché**

	Fréquence
sain / garanti, rassurant	16
pas de différence	12
plus vieux / pas très jeune	8
pas de produits de traitement, non plus de produit chimique	5
pas attirant , pas beau	5
plus cher	4
comme au marché (mais endroit propre, beau, emballé)	4
pas très bon	3
pas de garanti/ peu de confiance	3
couleur verte	3
petites tiges	2
petites feuilles	2
pas frais car il est mis dans les chambres froides	2
plus dure	2
n'est pas écrasé	2
pas pratique, on ne peut pas choisir	2
périurbain, Van Noi	2
pas d'insectes	1
facile à laver, pas d'azote	1
pour ceux qui ne savent pas choisir	1
Meilleur	1

**Tableau 14 : Associations à partir du couple liseron/périurbain**

	Fréquence
bon au goût, pas amer, sucré après cuisson	16
pas de différence, ne connaît pas	12
plus jeune	10
pas très assuré / pas assurant / avoir peur qu'il cause des intoxications / pas de confiance traitements	9
Xo moi, liseron d'étang	8
à tremper avant la cuisson	4
plus tendre	3
tiges fines	3
eau de cuisson transparente	2
facile à acheter / pratique pour les courses	2
tiges et feuilles de petite taille	2
un peu vert	2
très vert / vert foncé	2
à acheter auprès des vendeurs connus	1
tiges longues	1
légume irrigué	1
visqueux, pas bon	1
Croquants	1
bon marché	1
liseron de marché	1
plus cher	1
Vieux	1