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Consumers' Perception of the Watercress Quality in Antananarivo. Process of Quality 'Watercress Chain'.

R. Ramananarivo

Département Agro-Management – Ecole Supérieure des Sciences Agronomiques – Université d'Antananarivo, Madagascar ; Projet Qualisann ; Institut Supérieur de la Communication, des Affaires et du Management, Antananarivo, Madagascar.

H. Randrianasolo

Département Agro-Management – Ecole Supérieure des Sciences Agronomiques – Université d'Antananarivo, Madagascar ; Projet Qualisann.

M.H. Dabat

CIRAD- Centre de Coopération Internationale en Recherche Agronomique pour le Développement, ARENA, Burkina Faso ; Projet Qualisann.

B. Andrianarisoa

Faculté des Sciences - Université d'Antananarivo, Madagascar ; Projet Qualisann.

S. Ramananarivo

Département Agro-Management - Ecole Supérieure des Sciences Agronomiques – Université d'Antananarivo, Madagascar.

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Abstract

Well-known for its high content on vitamin A, watercress is part of the greens widely consumed in the capital city of Madagascar and appreciated by the population. We can find two kinds of watercress' cultivation: the first one is grown in clear water in suburban area; the cultivation on terraces allows the water to be renewed regularly. The second one is located in polluted area with wastewater. Although the consumers concern about the production chain, the market remains stable. In fact, Qualisann project (Quality, Health and Nutrition), led by a multidisciplinary team from different universities, worked to ensure the quality of watercress and to evaluate risks for consumers and producers. This research suggests "How do consumers perceive the quality of the watercress and how to ensure the quality process by identifying the actors in the filiere and their role". A survey was conducted to understand consumers' perception of watercress quality, and the knowledge of the watercress plantation and the propensity to pay the quality of the watercress. A qualitative survey of 50 people was followed by a quantitative survey of 1,024 households. They provide the different quality criteria, the source of uncertainty of the quality and the actions from the consumers to face risks. Consumers adopt measures to prevent risks by washing and cooking before consumption. The study shows that consumers are responsible of their food safety. Their knowhow would be a significant contribution to deal with food healthiness. To increase

the efficiency of risk regulation, public information should be reinforced to limit asymmetric information.

INTRODUCTION

Urban and suburban agriculture has multifunctionality in numbers of southern countries including Burkina (Ouedraogo, 2000), Cameroun (Asaa Nguengang, 2008), and Madagascar (Dabat, 2006). For instance, for the food supply chain, it supplies the capital city of Antananarivo rice, vegetables such as tomato and cabbage, green like watercress (Aubry and Ramamonjisoa, 2007). Moreover, not only it provides reliable jobs for the population but it also protects the city from flood. Watercress is grown in the midst of the city of Antananarivo, particularly in lowland where the irrigation water is polluted. This water is likely to be contaminated by toxic elements, germs and other chemical products that might affect human and animal health. In fact, wastewater and rainfall are spread directly to watercress field due to the lack of appropriate water evacuation facilities. Therefore, the healthiness of watercress and other vegetables grown in these areas has been examined in the framework of a multidisciplinary research project Qualisann/CORUS 2. The core question of the project is ‘what kind of technical, economic, social and institutional basis can ensure the healthiness of these products, under the double side constraint: i) Limited governmental regulation and control, ii) Populations’ low purchasing power with an emerging opportunity from new food industries, supermarkets, newly implemented market facilities, and indirectly from consumers associations and NGOs. (Qualisann, 2007)

The first results of Qualisann investigation identified three sources of risks depending on the watercress value chain (Ravoniarisoa, 2009).

- Watercress field related risks, due to uncontrolled dust, urban waste, wastewater contaminated by germs, toxic chemical products.
- Production techniques related risks: excess use of chemical products such as fertilizers.
- Sellers’ behavior related risks, using water contaminated by germ to wash watercress; means of transport like rickshaw not appropriately clean, watering watercress with unclean water.

Nevertheless, these various risks do not prevent watercress consumption. A survey by Qualisann, in 2008 revealed that 30 to 40 % of household consumes watercress at least once a week, and more than 60% at least once a month (Rakotonirainy, 2008). Moreover, the watercress demand is stable, with a total production of 20,000 to 40,000 t a year (Dabat et al., 2010; Ramahaimandimbisoa, 2007). Therefore, the question is how to explain the stable demand of watercress in Antananarivo. Do consumers perceive watercress as risky as scientists do? What are consumers perception about the healthiness of watercress? That leads us to formulate our research question: ‘do consumers have a role in the improvement of watercress quality?’.

The core hypothesis specifies that consumers play important role in improving the healthiness of watercress in Antananarivo.

Three research questions have been indentified:

- What are the healthiness criteria perceived by consumers?
- Do consumers agree with the sanitary risks emitted by scientific studies?
- How do consumers manage to face risks before consumption?

The research aims to determine consumers' role in the process of watercress quality improvement. Specific objectives have been identified:

- Identify quality characteristics perceived by consumers,
- Find the risks that consumers perceive
- Determine the solutions that they adopt to deal with watercress consumption health related risks.

Three hypothesis were formulated:

- Consumers perceive watercress as a nutritious food.
- The watercress is considered unsafe due to different risks mainly attributed to the geographical location of their cultivation.
- Different treatments have been adopted by consumers in Antananarivo to address the problem of watercress unhealthiness.

MATERIALS AND METHODS

The research has been conducted in two phases:

Qualitative survey

50 people have been interviewed; they are randomly selected out of the population of six Firaisana, in the urban district of Antananarivo. The survey directive consists of some core principals: rational for consuming or not watercress, quality criteria during the purchase, whether they know the watercress origin, familiarity with watercress field and production techniques. Information was collected locally during meal preparation.

After the translation of the data into French, they are computed manually by counting the most frequently words.

Extensive quantitative survey

1,024 households have been conducted by six agents during a month and half toward people who regularly do groceries. Questions were oriented to the quality criteria by consumers, and the treatments and measures that people adopt to deal with safety concerns. We use SPSS software for the data processing: frequency tables, cross tabulation, descriptive statistics.

RESULTS

Watercress in Antananarivo is perceived as harmful for consumers' health

1. Different quality characteristics identified by consumers. Three quality characteristics are the most important for consumers' decision (Table 1): freshness 96.4%, external aspect 95.4%, and cleanness 93.1%. Buyers prefer watercress harvested in the morning of the same day, with their leaves entirely green, long and rounded stem.

2. Consumers acknowledge that watercress has high nutritional value. This nutritional value has been identified by asking the question 'why do you eat watercress?'. Also, consumers appreciate the watercress savor. The survey outcome is clear (Fig. 1): 65% of consumers in Antananarivo admit that watercress has an outstanding nutritional value. 17.3%

declare that it has the same nutritional value as other vegetables. The remaining 17% consider that watercress is not nutritious at all.

3. The healthiness of watercress divides people opinion. During the qualitative survey, watercress healthiness remains the main quality criteria perceived by consumers. (Fig. 2)

- 37.4% are worried about the healthiness of watercress, of which 6.5% admit that the risk is severe.
- 29.1% think that it is healthy.
- 32.5% agree that the current quality of watercress is acceptable.

4. Reasons for non-consumers. Non-consumers, for more than a year, emit diverse reasons for not consuming watercress. The majority 52.9% are worried about the safety of their family, of which 0.8% follow physicians recommendation to abstain its consumption. 0.2% have digestive problems associated to watercress consumption. Only 18.8% of households have some of their members who do not like its savor.

These results revealed that there is an uncertainty regarding the watercress safety because 53.5%, more than half of the sample do not consume it for health concerns.

Healthiness depends primarily on the production zone.

Three main factors have been identified for the unhealthiness of watercress (Fig.3). 96% of people attribute the safety concerns to the use of wastewater for irrigation. Whereas 40% admit that the unhealthiness is related to the growers practices. Only 28.4% acknowledge that sellers practice affect significantly the quality of watercress.

1. Knowing the watercress production zone. When consumers were asked if they are familiar with watercress plots, and what do they think about growers practices, they think the practice and the place are disgusting due the neighboring household wastewater spread in these places.

Therefore, further analysis has been performed concerning this issue, following three complementary aspects:

2. Geographical origin. The majority of consumers know where the watercress they purchase originates. Intra-muros, literally means between walls is dominant. Only 20.2% do not know the origin of the watercress that they consume.

3. Classification regarding the healthiness of the production zone. The majority 51.2% think Andravoahangy site produces the worst quality of watercress. 48.8% do not mention any preferences. For the best quality of watercress, the result is unclear. 41% didn't express their opinion, whereas the most mentioned site was Ambanidia with intra-muros 23.8%, followed by rural zone including Betafo-Antsirabe with 18.2%. Ambatomanga, a site qualified as a reference site by Qualisann, is only mentioned by 6% of urban consumers.

Quality improvement measures by consumers

To ensure the watercress healthiness, consumers adopt three measures (Fig.4): They carefully choose the origin of the watercress during purchases. 65.6% of those worried about the safety of watercress think this measure could solve the problem. They cautiously wash watercress. 82.6% admit that this could eliminate all sanitary risks. 94.5% don't eat rough watercress, and consider cooking as the most effective treatment.

However, using these three measures, opinions are still divided. Some think that the risks can be eliminated completely, while others are convinced that the problem is just partially solved. The qualitative survey revealed that 56.1% of non-consumers admit that cooking can solve watercress safety concern.

For some doubtful consumers, any of these measures can solve entirely the problem.

DISCUSSION AND RECOMMENDATIONS

Tradeoff between healthiness and nutritional value of watercress

29.1% of Antananarivo populations think watercress is healthy. The majority claims that it is either unsafe, 37.4%, or has negligible nutritional value 32.5%. For those who consume watercress, it is basically because they perceive it as a highly nutritious food. For that, they carefully wash and cook to make sure of its healthiness. We are talking here about tradeoff, which means there is a complexity in choosing between healthiness and nutritional value.

This tradeoff seems to be even more problematic when these two criteria are qualified, by Darby and Kami (5), as 'belief criteria'. That is because consumers don't have the ability to justify the veracity of those criteria. Consumers cannot differentiate with certainty the origin of watercress. They primarily rely on the suppliers' reputation. Therefore, it is important to rely on 'quality indicators'. However, for watercress neither the price nor the seller is qualified as a 'quality indicator'. For consumers, the most effective solution is to improve the sanitation of watercress field, which requires government and divers institutions involvement.

Consumers' perception of watercress quality related to the production site

Consumers consider that the production site affect the most the healthiness of watercress. Watercress plot are usually classified as unclean, with a disagreeable odor. Producers are blamed of being careless by not sanitizing regularly their plots. Watercress is appreciated according to the plot where it was grown, that is due to the fact that some of the costumers live by the production zone. Rural population of Antananarivo could not perceived watercress as unhealthy. Therefore, the watercress plot quality appears to be a major selection criteria for consumers.

Quality improvement process and risks management

Watercress quality improvement involves different actors following the value chain. For instance, in Koutiala Mali, collective actions have been performed by grouping sellers, and by setting the price (Moustier, 2006). For Antananarivo, consumers themselves take care of the quality improvement by: choosing carefully the watercress origin, cautiously wash during the preparation, and cooking before consumption. Consumers perceived these measures as totally efficient.

1. Abstention of watercress consumption. Another choice could be to abstain watercress consumption. This consumers behavior is conform to the Fischler principles, which analyzes consumers' concern about eating doubtful food. After consuming such food, there is a chance of germ contamination.

2. Choice during the purchase. Consumers can either choose cautiously their watercress during the purchase, following the quality criteria mentioned above. Or they can decide not

buying at all in case of non-satisfaction regarding the watercress quality. Moreover, another precaution could be not asking other to do the purchase. That is also a consumers' behavior to deal with sanitary risks.

3. Washing and cooking measures. To face risks, washing and/or cooking are the most commonly adopted measures by consumers in Antananarivo.

Consumers' knowhow regarding food risk management

The washing and cooking practices to treat sanitary risks required certain knowledge. This knowledge is supposed to spread by each and everyone. Education, information appears to be an effective mean to make consumers in Antananarivo more responsible for their health. Therefore, government institutions as well as private actors must include more consumers in the economic system. The consideration of different actors knowledge in economic analysis belong to the so-called theory of 'Economic Conventions'. According to Eymard-Duvernay and Favereau, agents' capacity is measured by their ability to deal with different regime, to adapt and respond to variability of their environment (Eymard- Duvernay and Favereau, 1996). It seems that for the case of watercress, consumers' knowhow is reflected by their ability to adapt to the food safety concern. Therefore, concerning market actions coordination, the current watercress case study recalls the 'domestic convention type' (Sylvander, 1995).

CONCLUSION

The research question was whether consumers have a role in the improvement of the healthiness of watercress in Antananarivo. Qualitative and quantitative surveys have been conducted in six Firaisana in the City of Antananarivo. The findings reveal that the quality criteria include: freshness, odor. Consumers perceived nutritional value as well as healthiness of watercress but this perception is still uncertain. In the meantime, they keep consuming watercress while adopting some treatments and measures to face safety concerns. For that, consumers choose carefully the origin of their watercress, wash and/or cook it before consumption. The limitation of this practice could be water and fire wood availability for poor households. Therefore government intervention is required to facilitate the access to appropriate resources. Information and education are mandatory to provide consumers information about safety concerns, and appropriate measures to face those risks. Actions need to be performed especially for Andravoahangy sites. Further research on the implementation of institutional quality will be conducted shortly, given that watercress quality improvement involves not only government but also all the actors in its value chain.

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Tables

Table 1. Quality characteristics identified by consumers in Antananarivo

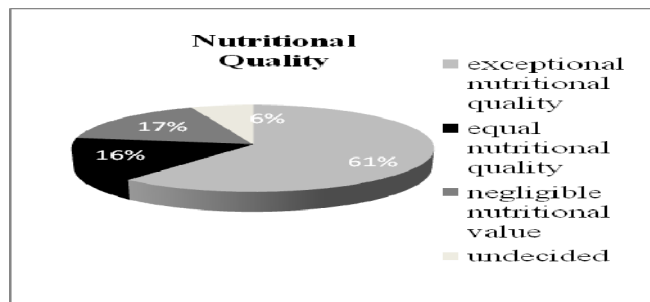
%	not at all	not really	a lot	very important	TOTAL
freshness	0,3	3,3	55,1	41,3	96,4
Cleaness	0,9	6,0	54,0	39,1	93,1
external aspect	0,8	3,8	63,0	32,3	95,4
texture quality	6,5	17,8	56,1	19,6	75,7
Odor	19,9	8,5	48,5	23,0	71,5
shelve display	22,5	12,8	40,0	24,8	64,8

Seller	15,4	22,8	36,7	25,0	61,8
sale place	22,1	16,1	37,1	24,7	61,8
Variety	36,6	17,7	32,1	13,6	45,7

Source: survey, 2010

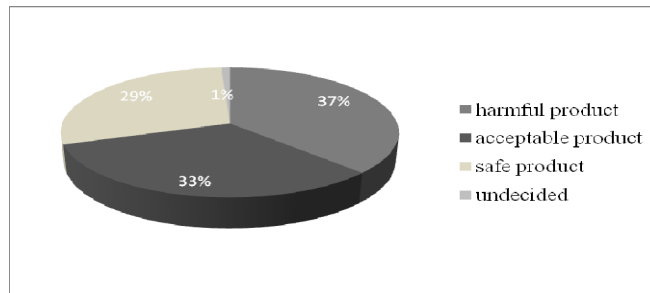
Figures

Fig. 1. Nutritional quality by consumers of Antananarivo



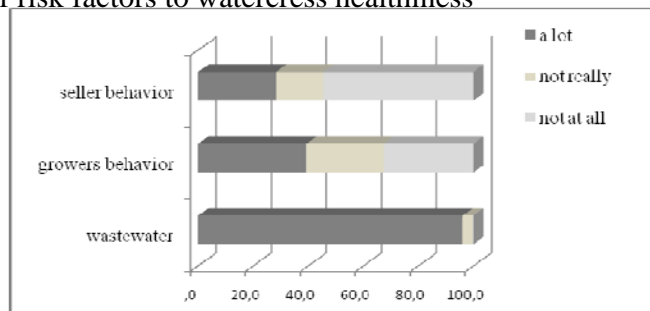
Source: survey, 2010

Fig. 2. Healthiness of watercress by consumers' opinion



Source: survey, 2010

Fig. 3. Contribution of risk factors to watercress healthiness



Source: survey, 2010

Fig. 4. Watercress process qualification

