

Importance of food safety in the vegetable production and supply chain

Sareen, S.

SENIOR FOOD SAFETY & NUTRITION OFFICER
FAO REGIONAL OFFICE FOR THE ASIA & THE PACIFIC
shashi.sareen@fao.org

ABSTRACT

Food safety has become increasingly important with globalization due to various factors such as volume and diversity of trade in foods, greater public demand for health protection, changing hazards e.g. resistant microbes, more sophisticated methods for detection of hazards, changes in production and consumption pattern, etc. Food safety contributes significantly to food security as unsafe and poor quality food leads to illnesses as well as food wastage. This leads to a strong need to emphasize not only on availability of food but also ensure that the same is safe.

The problems of safety are complex and systemic, often extending from the production environment to the end consumer. The concerns are felt and expressed, not only by the consumers worldwide who have become conscious of safe food and are discerning in their preference for high quality products, but also by the governments, who have recognized their role in protecting the health and safety of their populations by imposing stringent requirements for the product and processes. Major food safety concerns in the vegetable production and supply chain relate to residues of substances used in agricultural production and processing systems, environmental contaminants, microbiological parameters, pests, disease as well as various aspects of hygiene controls.

In this presentation, the relationship between food safety and food security is explained, the major emerging food safety issues in Southeast Asia with specific focus on vegetables production and supply chain are elaborated and the important approaches or focus areas for meeting food safety are highlighted.

FAO plays an important role in supporting the establishment and implementation of international frameworks related to food safety and trade. This includes its involvement in international standards setting mechanisms such as the Codex Alimentarius Commission (Codex) as also support in capacity development. The paper covers some of the activities of Codex and FAO as well as important documents produced in the area of vegetable production and supply chain.

Meeting food safety requirements is a challenging task. Some challenges to address food safety needs are also highlighted and suggested strategies and initiatives to address these are discussed.

Keywords

Food safety, Codex, FAO, vegetable supply chain safety

INTRODUCTION

With globalization and the establishment of the World Trade Organization (WTO) and the signing of the non tariff agreements, the international scenario has rapidly changed and opportunities are available to all countries to benefit from greater access to world markets. Food safety has gained greater importance due to various factors such as increasing volume and diversity of trade in foods, greater public demand for health protection, changing hazards eg resistant microbes, more sophisticated methods for detection of hazards, changes in production and consumption pattern, etc. In this global scenario, countries need to ensure confidence in the quality and safety of their foods, both for protecting the health of the consumers and gaining market access.

In this paper, the relationship between food safety and food security is explained, the major emerging food safety issues in Southeast Asia with specific focus on vegetables production and supply chain are elaborated and the important approaches or focus areas for meeting food safety are highlighted. The presentation covers some of the activities of Codex and FAO as well as important documents produced in the area of the vegetable supply chain in relation to quality and safety. Meeting food safety requirements is a challenging task. Some challenges to address food safety needs are also highlighted and suggested strategies and initiatives to address these are discussed.

Food safety – linkage to food security

Food safety contributes significantly to food security as unsafe and poor quality food leads to illnesses as well as food wastage. This leads to a strong need to emphasize not only on availability of food but also ensure that the same is safe. Food security is defined as “all people, at all times, having physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” [World Food Summit, 1996]. There are four pillars of food security and food safety is the major contributing factor to the fourth pillar ie ‘Utilization’. The pillars of food security and the determinant factors of each pillar are shown in figure 1.

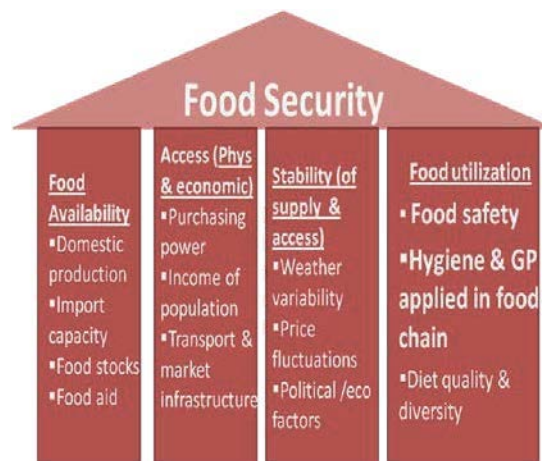


Figure 1. Pillars/dimensions of food security and determinant factors of each pillar

Food safety contributes to food security through a number of ways such as contribution to improved nutrition and health status of population thereby increasing productivity and livelihoods; reducing public health costs through a decrease in food borne illness among vulnerable populations and related social and economic implications; reducing food losses both pre and post harvest thereby resulting in increased food availability, stability, and utilization; increasing market access, purchasing power which results in beneficial effects on farmers, food businesses and consumers.

Major food safety issues with specific focus on vegetables

The problems of food safety are complex and systemic, often extending from the production environment to the end consumer. The concerns are felt and expressed, not only by the consumers worldwide who have become conscious of safe food and are discerning in their preference for high quality products, but also by the governments, who have recognized their role in protecting the health and safety of their populations by imposing stringent requirements

for the product and processes. Along with this are private standards, which are being imposed by supermarkets and are at times even more stringent than government requirements.

Major food safety concerns in the vegetable production and supply chain relate to residues of substances used in agricultural production and processing systems, environmental contaminants, microbiological parameters, pests, disease as well as various aspects of hygiene controls. The residues originate primarily from nitrates, fertilizers and pesticides and contamination takes place primarily because of poor agricultural practices and overuse of chemical substances on farm lands.

During the Regional workshop on the “Use of Science throughout the Food Chain for Safe Foods, held in Bali, Indonesia in November 2010, participants identified the foods and contaminants in each food group which in their opinion were a major cause of concern for their countries. These, as related to horticulture sector are reproduced in Table 1.

Table 1. Risk factors in food

Country	Food	Contaminants/Hazards
Bangladesh	Processed foods	Food additives including food colours, artificial sweeteners, aflatoxins
Bhutan	Apple/Mandarin	Pesticide residues
Lao PDR	Vegetables and fruits	Pesticide residues, unpermitted food additives
Malaysia	Vegetables	Pesticide residues
Nepal	Leafy vegetables	Pesticide residues, heavy metals, colours
Pakistan	Dry chillies	Aflatoxins
	Mango & citrus fruits	Pesticide residues
Thailand	Fruits and vegetables	Pesticide residues, microbial contaminants
Vietnam	Fruits and vegetables	Pesticide residues

In the Guidelines for risk categorization of food and food establishments developed for ASEAN countries and published by FAO as RAP Publication 2011/22, it is observed that most fruits and vegetables either fresh or processed fall under the category of medium to low risk. However, the food service sector which would include vegetable preparations is covered under high risk category (Table 2).

Meeting food safety requirements – the approach

To meet food safety requirements, some important approaches or strategic developments that have been covered in this paper include food chain approach, responsibility of food safety with all actors in the food chain, implementing a preventative approach based on risk, and implementing effective food control systems.

Over the last few years, the food chain approach has been recognized as an important concept to ensure food safety for the consumers. This approach recognizes the inter-linked nature of food production and acknowledges that food safety hazards may arise at different stages of the food supply chain from production up till consumption. To ensure the safety of food, the hazards associated with different stages namely raw materials, farming practices and food processing activities need to be prevented from entering the chain or reduced to acceptable levels at each and every stage. This requires the commitment of all players in the food chain, involving producers, traders, processors, distributors, government as well as consumers who share responsibility for ensuring food safety as well as quality.

Food control has also now shifted from end-product inspection & testing to a risk-based preventative approach which requires building quality and safety throughout the food chain. In the earlier reactive approach, the focus was on detecting the problem and disposing the food or reworking on the same while in the preventative approach the focus is on ensuring that hazards are prevented to enter into the food chain through implementation of good practices (such as Good Agricultural Practices, Good Manufacturing Practices, etc), HACCP systems and Food safety management systems such as ISO 22,000.

Table 2. Risk categorization of businesses dealing with primary and secondary foods (Guidelines for ASEAN)

Fruits & Vegetables	Main Activity	Risk Categorization		
		High	Medium	Low
Vegetable farm	Farming, harvesting, packaging, fresh handling		X	
Dried fruit	Cutting, sugar mixing, drying, packaging			X
Fruit in vinegar, oil, or brine	Cutting, deeping in vinegar, oil or brine			X
Canned/ bottled (pasteurized) fruit/veg	Cutting, blanching, filling in can/bottle, pasteurization		X	
Jams, jellies, marmalades	Cutting, pressing, sugaring, cooking, setting, pkg			X
Candied fruit	Formulation with sugar, dehydration			X
Pickled vegetable	Cutting, brining, fermentation			X
Paseurized fruit /veg juices	Extracting, filtering, pasteurizing, cooling		X	
Sterilized fruit & veg juices	Extracting, filtering, sterilizing, aseptic packaging		X	
Fresh fruit/sugarcane juice	Cutting, extracting, filtering, pasteurizing, aseptic packaging		X	
Retailer level-Fruit/veg raw	Collecting, selling			X
Fruits & veg- processed	Formulating, processing, serving		X	
Food service: Hotels, caterers, canteens, street food vendors, restaurants	Preparing various RTE foods	X		

Implementing effective food controls systems in countries would need to address health and safety for domestic populations (covering both domestic production and imports) as well as for exports to ensure that safe food enters regional and international trade. The basic components of food control systems include the legislative framework; controls systems and procedures; facilities and equipment including laboratories; transportation and communication; and personnel and their training. To be effective, the controls need to be applied at both national levels in countries as well as at the provincial levels. It is also important to cover standards for both, products and processes as well as the conformity assessment aspects which include certification and accreditation procedures in addition to testing and verification.

CODEX/ FAO Activities

FAO plays an important role in supporting the establishment and implementation of international frameworks related to food safety and trade. This includes its involvement in international standards setting mechanisms such as the Codex Alimentarius Commission (Codex), International Plant Protection Convention (IPPC) and World Organization for Animal Health (OIE). The standards set by Codex for food safety have become specifically important as these have been referenced as baseline in the SPS Agreement for meeting human health requirements for international trade. Codex documents as relating to vegetables include commodity standards established through two commodity Committees namely Codex Committee for Fresh Fruits and Vegetables and the 'Codex Committee for Processed fruits and vegetables'. In addition there are general standards also known as horizontal standards which apply to the whole range of products including vegetables and cover various areas namely general principles, food hygiene, contaminants in food, food additives, pesticide residues in Food, food labeling, methods of analysis and sampling, food import and export inspection and certification systems, etc. Some important documents developed by Codex in relation to vegetable sector include:

- Special Publication on fresh fruits and vegetables 1st edition which contains the standards on 27 fresh fruits and vegetables

- Standards on processed and quick frozen fruits and vegetables
- Standards on fruit juices
- The recommended international code of practice for packaging and transport of fresh fruits and vegetables
- Code of hygienic practice for fresh fruits and vegetables
- Maximum residue levels (MRLs) and extraneous maximum residue levels (EMRLs) for pesticides

These are available on the Codex website at www.codexalimentarius.net.

FAO is also working towards meeting the needs for countries in the region for policy guidance, communication and information exchange mechanisms and capacity building in food safety through the provision of technical assistance and implementation of field projects and capacity-building activities. Some FAO activities on food safety with specific focus on vegetable production and supply chain are highlighted below.

Some guidance documents of relevance to the area of vegetable safety include:

- The role of post harvest management in assuring the safety and quality of horticulture produce
- Post harvest management of fruits and vegetables in the Asia Pacific region
- Horticultural chain management for countries of Asia and the Pacific Region – A training package
- A practical manual for producers and exporters from Asia – Regulations, standards and certifications for agricultural exports
- Food Safety Manual for Farmers Field Schools – A training reference guide on food safety in global Farmer Field School programmes
- FAO/WHO Guidelines for developing FSER plans
- FAO/WHO guide for application of risk analysis principles and procedures during food safety emergencies
- A training manual in food hygiene and HACCP systems

On the project front, some current projects on food safety and quality relating to vegetable sector in Asia include:

- i) Capacity Building for food inspection systems in Vietnam
- ii) Strengthening Vietnamese SPS capacity for trade – improving safety and quality of fresh vegetables through value chain approach
- iii) Improving food safety, quality, hygiene and food control in Bangladesh
- iv) Enhancement of laboratory capacity on food safety in primary production in Thailand
- v) Enhancing Sanitary and Phytosanitary Capacity of Nepalese Ginger Exports through Public Private Partnerships

In addition, some case studies published recently under projects and of relevance to this sector include:

- Group Inspection and Certification for small farmers of Thailand – A case study covering best practices throughout supply chain for domestic and export markets
- SALM inspection and certification scheme of Malaysia
- A case study on the inspection and certification systems for Good Manufacturing Practices (GMP) in processed foods in Indonesia
- A case study on the inspection system for the food service sector including street foods, restaurants and canteens in Vietnam

Further, training material on ASEANGAP implementation, certification and accreditation of fruits and vegetables is currently under development under an ADB funded project.

A case study on QGap protocols and Organic accreditation systems and farmers training programmes in Thailand has also been documented to analyse the strengths and drawbacks of the systems in Thailand and how these could be made more effective.

Challenges to meeting food safety requirements

Meeting food safety requirements is a challenging task. Some challenges to address food safety needs both at international and national levels are highlighted and suggested strategies and initiatives to address these are discussed.

International level

Implementing food safety measures in a world of increasing food insecurity is a major challenge as on the one hand there is already food insecurity while on the other due to issues such as product past “best before” date; residues of pesticides or veterinary drugs, contaminants, etc higher than permitted limits result in the products being declared unsafe for consumption and even destroyed. Such measures would lead to further food insecurity. Further, due to recession and financial crisis, governments and producers tend to invest more on essentialities rather than on non-tangibles such as implementing food safety measures or spending on certifying costs for verification of quality and safety such as for ISO 22 000, GAP schemes, etc;

Communicating or illustrating the value of food safety has always been very difficult as firstly food safety is not very tangible and again the indicators of food safety relating to illnesses are not always demonstrable. Further, not many studies exist on the cost of implementing food safety and quality vs-a-vs the financial benefits.

Scientific progress is important and has led to development of more sensitive detection methods for pathogens/contaminants with has resulted in more stringent limits being imposed by governments. The minimal limits are therefore, dictated by scientific and technical developments rather than risk. The impact of the more stringent requirements is higher costs in meeting these without clear justification of the additional risk of the more stringent requirements.

Hazards are continually changing or new hazards are being detected as in the case of melamine, dioxins, additional pesticides, newer pathogens, etc which reflects the need to keep continuously alert and updated and address the challenges due to emerging hazards.

Another important challenge is meeting the range and diversity of food safety standards including public vs. private, varying requirements of different markets/ countries. These aspects are often debated even at the global level, however, no clear solutions on the same are evident.

Country level

At the country level also the challenges are many and include overlap of responsibilities for food control between different organizations which highlights the need for role clarity and coordination in a country; inadequate regulatory conformity assessment infrastructure in relation to testing and data collection to support a risk-based approach; participation and support to international standards setting; inadequate infrastructure in terms of safe transportation, maintenance of cold chain during storage, transportation as well as at retail level; lack of availability of sufficient and qualified manpower for activities such as inspection and testing that needs to be oriented towards a risk-based preventative approach. A major challenge is the need to have a sound linkage between the processor and primary producers so that the processor can build upon the controls maintained during primary production and also meet the traceability requirements in case of any food safety issues arising in the product at a future period. Low awareness amongst various stakeholders including farmers, input producers, food processors, government authorities on good practices and their linkage to reduce contaminants and improve food safety is also a major challenge.

Strategies and initiatives to address challenges

To address the challenges identified, some strategies are discussed below under five basic areas.

i) Standards: This is a very important area and is the base for ensuring safety of foods. At the international level it is important that Codex standards have a scientific basis for which it is necessary that countries should contribute to the same through provision of data as well as participating in the meetings of Codex. At the National levels, standards need to be adopted for both product as well as process (including GAP). Currently a number of voluntary and private standards are being implemented by retailers, food industry, etc and they have been working with farmers to strengthen the implementation; it is important to take advantage of these private initiatives for food quality and safety and government needs to work out strategies to build on these for ensuring safety of vegetables and vegetable products.

ii) Implementation: Implementation of standards and systems is an important area and would need to address the farm to table approach and cover vegetables used in street foods, retail, restaurants, and the processed foods sector. At the farm level, implementation of GAP should address a range of contaminants/ hazards and not only pesticides and chemicals as is often the case. Another important area requiring focus is the infrastructure in terms of cold chains, transportation, equipment for basic processing at farm level, testing facilities, etc. Traceability aspects are also weak in this sector and specific focus should be given to maintenance of records and having accurate labelling on the products so that these can be traced back to farms.

iii) Governmental regulation & inspection: At the governmental level, it is important to have a policy on safety and quality (covering production, processing, storage, transportation, water/raw material, etc). In Bangladesh, it is being suggested by stakeholders to cover GAP in the food safety policy so that the area gets specific focus. The independence of inspection and certification is also important for effective results and should be delinked from the promotional, facilitation as well as extension aspects. It is also very important to coordinate activities of central, state and local governments within countries – it may be mentioned that so far the emphasis of providing assistance has generally been focussed towards central governments.

iv) Laboratory/testing aspects: Support is required for the establishment/ strengthening of laboratories for testing for GAP aspects such as pesticide residues, heavy metals, quality of soil and water, microbiological tests. Preparation of test methods manual for identified products would also be useful as well as the use of ready to use validated quick test kits.

v) Training: To address the issue of low awareness of stakeholders on food safety issues, it may be pertinent for international organizations as well as governments of countries to organize awareness and training programmes at various levels in countries and the region to cover GAP trainings including group inspection and certification schemes, trainings to auditors on inspection and audits aspects for various food safety schemes, publishing good practices as well as successful practices on food safety. It is also important for stakeholders to have information on the specification requirements of various markets/ other countries and organize awareness programmes on the same.

vi) Consumers: Awareness and education on safety aspects covering production, storage, cooking of vegetables is important. It is also important for consumers to understand the meaning of safe vegetables or GAP certified as also to read and understand the labeling requirements and clauses. Consumer education can also be built into school curriculum.

CONCLUSION

In conclusion it may be emphasized that food safety for the vegetable production and supply chain is extremely important for maintaining the health and wellbeing of populations as also for

market access. There are the existing and emerging food safety hazards which need to be addressed at the international level and by countries. This is not a simple task and there are numerous challenges faced both at international and national levels which need to be collectively strategized and addressed.

References

Guidelines for risk categorization of food and food establishments developed for ASEAN countries. FAO RAP Publication 2011/22.