

Enhancing food safety by strengthening food inspection systems in ASEAN countries

(GCP/RAS/222/JPN)

Case studies on inspection and certification

Case study 3:

**Group inspection and certification for small farmers of Thailand:
a case study covering best practices throughout the supply chain
for domestic and export markets**



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Case study 3: Group inspection and certification for small farmers of Thailand: a case study covering best practices throughout the supply chain for domestic and export markets

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Foreword

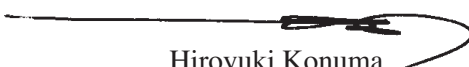
Food safety is of considerable significance from both the health and economic perspectives. Safe food is of importance in protecting the health of consumers by preventing both acute and chronic food borne diseases. With globalization and a greater movement of food across borders, quality and safety have become even more critical. Consumers are showing a preference for high quality and safe food while at the same time governments are laying down stringent requirements relating to pesticide residues, contaminants, microbiological parameters, pests and disease, as well as various aspects of hygiene controls so as to protect the health and safety of their populations.

The problems of quality and safety are complex and systemic, often extending from the production environment to the end consumer involving the entire food chain. There is also a shift from end product inspection and testing to a preventative systems approach based on risk. This necessitates not only implementing standards for the end product but also standards on good practices to include Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP) and Hazard Analysis and Critical Control Point (HACCP) systems at various stages of the food chain consisting of the primary production sector, the processing sector, the distribution, retail and food service (including street foods) and the consumer sector. The role of food control, which is of paramount importance to assure food safety and quality, has also shifted from end product inspection and testing with corrective actions towards food safety concerns to preventive checks on the controls put in place in operations to address food borne risk factors all across the food chain. This approach necessitates not only a change in the mindset of inspectors – from regulators to food safety professionals – but also a need for additional and varied skills for the purpose.

ASEAN countries have made remarkable progress in improving food safety standards and increasing the competitiveness of their food and agricultural products to increase food exports. These achievements need to be strengthened and expanded to further improve food safety not only to protect the health of their own domestic consumers but also to promote regional trade opportunities, earn more foreign exchange and expand tourism by providing safe food to travellers. For this purpose, regional cooperation and exchange of information at all levels must be strengthened.

In order to address the various issues connected with this important activity of food control, under the regional project “Enhancing Food Safety by Strengthening Food Inspection Systems in ASEAN Countries”, funded by the Government of Japan, four case studies have been published on different dimensions of inspection and certification. The case studies were selected so as to provide an opportunity for the most successful practices developed in one country to be used as a model for other countries in the region. They were prepared by specialists within the country with expertise in the subject matter. These were subsequently discussed in a regional workshop attended by participants from ASEAN countries and based on the feedback, edited into a uniform format. I take this opportunity to convey FAO’s appreciation and gratitude to the Government of Japan for its liberal contribution towards this project.

This case study is on group inspection and certification for small farmers covering best practices throughout the supply chain for domestic and export markets in Thailand. It is hoped that the results of these efforts will be of immediate relevance to the countries of the ASEAN region in particular, and to developing countries in general, especially at this present juncture of increasing complexities of worldwide food production systems, and the growing potential for new hazards associated with changes in food production and consumption patterns.


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Abbreviations and acronyms

ATTC	Agricultural Technology Transfer Centre
APSSRDO	Agriculture Production Science Services R&D Office
BOT	Board of Trade of Thailand
CB	certification body
DOAE	Department of Agriculture Extension
DLD	Department of Livestock Development
DOA	Department of Agriculture
DOF	Department of Fisheries
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GAP	Good Agriculture Practices
GMP	Good Manufacturing Practices
GTZ	German Technical Cooperation
Ha	hectares
HACCP	Hazard Analysis and Critical Control Point
ICM	integrated crop management
IPM	integrated pest management
ISO	International Organization for Standardization
JGAI	Japan Good Agricultural Initiative
MOAC	Ministry of Agriculture and Cooperatives
MRL	maximum residue limits
NBACFS	National Bureau of Agricultural Commodity and Food Standards
NFI	National Food Institute
OAR	Office of Agriculture Regulation
OARD	Office of Agricultural R&D
OSMEP	Office of Small and Medium Enterprises Promotion
PQMS	plant quality management systems
PPRDO	Post-Harvest and Processing R&D Office
PTB	National Metrology Institute of Germany
QA	quality assurance
Q GAP	National GAP scheme for agricultural production
QPSIG	Quality and Product Standard Inspection Group
TOSSC	Technical One Stop Service Centre
TOT	training of trainers
WTO	World Trade Organization

Preamble

Maintaining a safe and nutritious food supply is an essential prerequisite to achieving food security, good nutrition and safeguarding the general health of populations. Food inspection plays an important role in this by making sure that the food meets the required standard and by preventing the adulteration of food and commercial fraud with respect to the sale of food, especially in terms of mislabelling of food products.

The project “Enhancing food safety by strengthening food inspection systems in ASEAN countries” (GCP/RAS/222/JPN) was funded by the Japanese government and was started in 2007. The objective of this project was to enhance food safety by strengthening food inspection systems in ASEAN countries covering domestically produced food, food import control and food export control. As part of the project a number of capacity-building activities such as regional workshops and training courses and national training courses in various aspects of food inspection were organized. In addition, case studies and guidance documents related to food inspection were prepared.

The project has contributed primarily to strengthening food inspection systems, including risk-based inspection and to facilitating recognition of and compliance with international food safety standards and guidelines with special reference to food inspection and certification. This should lead to improved food safety conditions in ASEAN countries, enhanced public health protection from food-borne diseases and facilitation of food trade by increasing competitiveness in the international market.

A series of four case studies to assess the various aspects of the food inspection systems in Indonesia, Malaysia, Thailand and Viet Nam were prepared. The needs for capacity building in food inspection systems and the factors associated with implementing successful inspection systems in the countries concerned have been identified.

The case studies have examined the existing capacity and performance of the food inspection systems according to circumstances and needs in the selected ASEAN countries where they were prepared. The assessments have covered systems of inspection and certification for selected aspects of either product-wise (processed foods, fruits/vegetables) or process-wise (food service) inspection systems for foods domestically produced, imported and exported. Because of the fact that the ASEAN countries are very different from one another, the following two approaches were used as a framework: 1) a ‘needs assessment approach’ with the purpose of identifying capacity building needs; and 2) a ‘lessons learned approach’ with the purpose of identifying successful factors in implementing food inspection system or certification schemes.

The case studies conducted were:

1. Indonesia: The inspection and certification system for GMP for processed foods.
2. Malaysia: The SALM inspection and certification scheme.
3. Thailand: The group inspection and certification system for small farmers.
4. Viet Nam: The inspection system for the food service sector, including street food, restaurants and canteens.

The following general outline was followed for each of the case studies with appropriate modifications to suit the requirements of the subject of each individual case study:

- i) Mission and strategy: mandates, functions, responsibilities of the various agencies involved in food inspection and enforcement.
- ii) Laws or regulations that provide rules and procedures for food inspection and enforcement, organizational charts of the agencies involved in food inspection and enforcement.
- iii) Operational principles and processes for food inspection and certification, consistency of inspection and certification activities by different agencies, planning, implementation and monitoring of inspection activities, compliance policies and certification.
- iv) Human resources: availability of human resources for food inspection and certification, technical and managerial skills training.
- v) Financial resources such as budget for food inspection activities.
- vi) Information resources such as systems for the collection, reporting and analysis of information related to food inspection. These may include a national database of food premises categorizing premises according to risk and including food inspection records.
- vii) External linkages and interdependencies, including linkages and cooperation between food inspectorates and other concerned stakeholders.
- viii) SWOT analysis of the food inspection system and recommendations for capacity building activities in the national food inspection systems.

The case studies were presented and discussed in the first regional workshop “Modern principles for food inspection and certification” held in Jakarta, Indonesia from 1 to 3 April 2008 in order to identify capacity building needs and priorities for follow-up assistance such as training courses and guidance in food inspection. Some of the case studies were revised to bring them up-to-date taking into account the latest developments in countries of the region. The case studies could be used by other ASEAN countries with appropriate modifications for setting up similar food safety inspection and certification systems or as training material.

Executive summary

All over the world the demand for food safety certification is growing. The supermarket chains, local agribusinesses and the consumers are demanding extra quality agricultural produce and the suppliers have to get their products inspected and certified against a government or private food safety standard. The major voluntary standard for food safety and sustainable production is the Good Agricultural Practices, more popularly referred to as GAP, which is relevant to farmers as it covers the agricultural production process from inputs to the farm gate.

In view of the requirements by overseas buyers to buy from farmers implementing and certified against GAP and the fact that costs to individual farmers in Thailand for private foreign certification are high, the Government of Thailand took significant steps towards the development, introduction and implementation of quality and safety Q certification programmes. The Department of Agriculture grants several certificates including Q GAP, Q Packing house and Q Shop, among others. A Quality Management System: Good Agricultural Practice (Q GAP) for on-farm production was developed by modifying the concepts of the international standards through three levels of certification: level 1 – pesticide-residue safe; level 2 – pesticide-residue safe and pest free; and level 3 – pesticide-residue safe, pest free and of premium quality.

In the government scheme, there are provisions for certification at the individual farmer level as well as at the level of a group of farmers. In the latter category, a group of small farmers producing related crops are inspected and certification is provided for the entire group. Whereas in the first category every plot is inspected, in the second category only sample plots are inspected. However, the various principles, criteria and assessments for quality management systems such as: the i) water source; ii) cultivation site; iii) use of agrochemicals; iv) product storage and on-site transportation; v) data records; vi) pest-free products and occurrence of plant diseases; vii) quality management in agricultural production; and viii) harvesting and post-harvest handling are the same. Appropriate guidance for development of the group set up and inspection and record keeping is provided by the Ministry of Agriculture and Cooperatives. The various constraints of the system and suggestions for improvement are provided in the case study.

The National Q GAP developed by the Government of Thailand is not internationally benchmarked. However, the Thai GAP, a voluntary private sector standard for safe and sustainable Thai farm products developed collaboratively by various stakeholders including the government and private agencies, was officially certified in May 2010 as being equivalent to the GlobalGAP standard. Recently the ASEANGAP has been developed to enhance harmonization of product standards and facilitate trade in ASEAN countries. It provides an opportunity for member countries to benchmark their country's GAP programme to achieve harmonization.

Case study 3: Group inspection and certification for small farmers of Thailand: a case study covering best practices throughout the supply chain for domestic and export markets

1. Introduction

Food safety, hygiene and quality are of considerable importance both from the health and economic perspectives. It is now globally well recognized that it is essential to maintain food safety, hygiene and quality throughout the food chain, i.e. from farm to plate. Improper food safety leads to food-borne diseases and ill health among consumers. Food-borne diseases can have economic impacts on individuals, food businesses and even countries. The risks of food-borne diseases could arise through microbiological and chemical contamination of food and agricultural products. In recent years the international trade in food has increased considerably and raises the risk that food contaminated in one country may cause an outbreak in another. Food commodities are regulated and the food exports that are rejected can result in significant economic losses of foreign exchange, especially important to developing countries. For these reasons government institutions and the industry are implementing management systems to reduce the possibility of food contamination to ensure that supplies to consumers are free from all kinds of harmful pathogens, adulterants and contaminants. Several practices are essential at different stages of the primary production of food to ensure the safety of the food supply. Documentation of successful practices facilitating the safety of foods would be useful for replication of the system within the country as well as in other countries of the region.

Thailand is basically an agricultural country with more than half of its estimated 63.5 million people engaged in the agriculture sector. Farm holdings amount to about 21 million hectares consisting of 5.67 million farms. During the last decade Thailand succeeded in attaining global leadership in the production and export of a number of agriculture commodities, especially fruits and vegetables. Exports of fresh and processed fruits and vegetables exceed over US\$1 billion per annum. About 47 million tonnes of vegetables are produced from 468 320 hectares and 38 percent of the produce is exported. Although more than 72 categories of vegetable are cultivated, the main vegetables crops, production area wise, are chili (22.4 percent), sweet corn (9.0 percent), baby corn (8.1 percent), yard long bean (3.8 percent), Chinese kale or broccoli (3.6 percent), cucumber (3.0 percent), water spinach (3.0 percent), and pumpkin (2.3 percent). The main exports of fresh vegetables such as asparagus, okra, shallot (small onion) and ginger are to Japan, Taiwan, Hong Kong and Malaysia; frozen vegetables like French bean, okra and sweet corn are to Japan, USA and EU; canned vegetables like baby corn, sweet corn and mushrooms are to EU and USA. The major fruits produced are mango, longan, durian, mangosteen, pomelo, litchi, melon group and banana, exported mostly to China, Japan, Malaysia, Singapore, EU and USA.

Although Thailand is a major producer of agricultural commodities including fruits and vegetables, it has faced problems in relation to exports. The main problems that were faced by Thailand in agriculture commodities and food exports were:

- produce or products with unacceptable levels of microbiological or chemical contamination;

- produce or products not conforming to Codex standards concerning hygiene or hygienic practice;
- limited facilities and resources for inspection and certification;
- lack of understanding of the requirements and necessary systems of control by agri-industry and government officials; and
- weak certification systems.

2. Objectives, scope and methodology of the case study

2.1 Objectives

The objectives of the case study are:

- i) to provide a situational analysis of the group inspection and certification system for small farmers; and
- ii) to identify success factors and lessons learned that can be used by other ASEAN countries in setting up similar inspection systems for the food service sector.

2.2 Scope of the study

The scope of the study was to cover best practices to be followed especially by the small farmers throughout the supply chain for domestic and export markets (for fruits and vegetables) and the provisions of the group inspection and certification system for small farmers to enable them to achieve their objectives. Although the study covered GAP, it was mainly confined to the role of small farmers.

2.3 Methodology of the study

The case study was originally carried out by Dr Teerapol Silakul, of the Department of Agriculture, Thailand during 2008. The methods followed to collect information on food inspection were literature review, focus group discussion, key person interviews and questionnaire survey. Local persons, namely members of the committees of the toxic-free asparagus group in Nakhon Pathom Province and an employee of Taniyama Siam Co., Ltd. in Kham Phang San District, Nakhon Pathom Province who bought asparagus from the group, were interviewed. Stakeholder consultation was through brainstorming meetings and communication through the coordinator of the company. Field research was carried out with the farmers groups that produce toxic-free asparagus in Nong Ngu Leum Subdistrict, Muang District, Nakhorn Pathom Province. Evaluation of the group inspection consisted of three focal points namely the group establishment, the internal quality audit and data collection of group.

The case study was revised during 2010 to make it up-to-date and further focus on group inspection for small farmers taking into consideration new information on GAP that has emerged in the intervening period.

3. Food safety initiatives and laws related to food safety

3.1 Thai initiatives on food quality

Exporters in Thailand were informed by importers in the late 1990s that they would need to upgrade the quality and safety of their export produce to conform to international standards. The new requirements required mandatory measures to be in place to ensure that produce and products were produced and packed to meet food safety (microbiological, chemical, physical) and quality requirements. The Taiwanese mandatory pesticide inspection rule in 1999 and the more stringent Japanese maximum limits for pesticide residues set in 2002 impelled Thailand to develop quality management systems, such as GAP in farm production and Plant Quality Management Systems (PQMS) for both farm and processing plants. Imposition of these measures enabled farmers to improve their implementation of standards and quality control, and establish a traceability system.

The Government of Thailand initiated measures so that it could maintain its competitiveness and position as one of the world's key food-exporting countries. It launched, during 2003, the "Kitchen of the World" programme, to promote Thai food products and Thai cuisine internationally by creating an image for Thailand as the country of quality and safe food. As part of the programme, the Ministry of Public Health designated 2004 as the "Year of Food Safety," implying that stricter measures would be implemented on inspection and certification of both food exports and imports. A Road Map of Food Safety was published by the National Bureau of Agricultural Commodity and Food Standards (NBACFS) during 2005. This contained strategies in five areas namely: i) agricultural inputs and raw materials; ii) production at farm level; iii) control of plant protection products; iv) quality crop production; and v) domestic and foreign markets. The Department of Agriculture (DOA) assumed the responsibility for ensuring that fruit and vegetable products are produced, processed and packed in compliance with import country requirements for quality and safety. Controls were being put in place from the farm level through to processing and packaging by promotion of GAP, GMP and HACCP schemes and implementation of inspection and certification services.

The Road Map of Food Safety framework was to be used throughout the food chain, which encompasses farm level production, production sites, food processing, food businesses, products, and marketplaces. The framework also clarified the distinct roles and responsibilities of each food control unit in Thailand so as to reduce the overlapping of roles among food safety control authorities. To respond promptly to the need for critical and urgent issues undermining food safety control implementation, the government also established a special task force to manage these problems.

The primary principles for the implementation of the Road Map of Food Safety include:

- equivalent food safety standards for both domestic and international consumers;
- standards for Thai food and agricultural products to be acceptable to the international community, and conform to international standards;
- establishment of sanitary and phytosanitary standards for Thai food and agricultural products to be based on science in order to protect consumers and producers of food and agricultural products; and
- an effective control system (from farm to table) including plant and animal quarantine that is equivalent to the systems in other countries and will ensure fairness in international trade as well as for domestic consumers.

The control procedures underscore the implementation of the quality assurance system, which is based on HACCP principles, as a proactive approach to control food safety across the entire food chain.

The conceptual framework and related activities resulting from the restructured food safety administration in Thailand focused on the following:

- strengthening the food safety control system in a more effective direction, i.e. more focus on the principle of prevention throughout the food chain rather than only inspection and rejection at the final stage;
- improving the food control risk management process, which needs to be based on science and transparent;
- improving capacity building of the food safety controls along the food chain through safety assurance schemes, conformance with international standards, and facilitation of mutual recognition agreements on conformity assessment with trading parties;
- optimizing the performance of all available resources involved in food safety through the management of strategies and operational activities under a single national policy;
- establishing more national voluntary standards and codes of practices to facilitate the certification system, particularly for primary products and market places, and promoting their implementation;
- increasing the efficiency of inspection services, especially for conducting risk-based audits under safety assurance programmes to support the proactive food safety system;
- improving laboratory performance and the coverage of the hazards involved in food safety; and
- improving communication and encouraging more involvement and responsibility of consumers, manufacturers and other stakeholders in food safety – campaigns teaching consumers how to select proper and safe food for themselves and their families have been carried out through several forms of media and through education programmes.

3.2 Laws and regulations

The responsibility for food control in Thailand is shared between different agencies and ministries. Laws and regulations pertaining to food safety in Thailand are as follows:

- i) Food Act B.E. 2522 (1979), Ministry of Public Health.
- ii) Hazardous Substances Act (concerning pesticides for agriculture) B.E. 2535 (1992) and Agricultural Commodity Standards Act B.E. 2551 (2008), Ministry of Agriculture and Cooperatives. Moreover, the Department of Agriculture has a Regulation on Certification of Crop Production to be in accordance with the Standard System for Quality Management on Implementation of Good Agricultural Practices B.E. 2547 and Notifications entitled Criteria for Exporting Certain Vegetables to the EU and Norway B.E. 2548. The notification issued on 18 August (2005) required that vegetables (coriander, stinking holy basil, sweet basil, ka-yang (*Limnophila aromatica*), peppermint, praeuw leaves (*Polygonum odoratum* Lour) and shallot) exports to EU countries must bear a certificate of analysis for *E. coli* and *Salmonella spp.*
- iii) Consumer Protection Act B.E. 2522 (1979), Consumer Protection Board functioning under the Office of the Prime Minister.

- iv) Product Liability Act B.E. 2551 (2008) imposes liability for unsafe products on manufacturers, sellers, importers and others in the distribution chain. This Act defines products as all kinds of products manufactured or imported for sale, including agricultural products and electricity but excluding products exempted under regulations. Agricultural products mean products from agriculture, including rice, fruit and vegetable, livestock, silk farms, lac (resin) and mushroom but excluding “products arising through natural processes”.

Currently Thailand does not enforce group inspection and certification systems for small farmers, but the Department of Agriculture requires exporters of 32 kinds of fresh fruit and vegetables to European countries to register with the department. Those exporters who wish to register with the Department of Agriculture must have GAP certification for all places of origin and GMP certification for all packing houses, in which the farms (production plots) can be certified either individually or in a group.

3.3 Quality management systems

The Thailand Ministry of Agriculture and Cooperatives has a policy to achieve high yields and high quality of crop production, so that it will increase farmers’ revenue and provide higher quality produce for consumers. Therefore, it is necessary to establish a quality system based on the GAP crop quality management system and to meet the regulations of the Department of Agriculture that certify crop productions that have met the standards of GAP. A quality management system is a set of interrelated or interacting elements that organizations use to direct and control how quality policies are implemented and quality objectives are achieved.

A working group set up by the Department of Agriculture in 2002 consisting of persons experienced in developing quality management systems (QMS) for fresh produce like vegetables, rice, herbs, assisted in developing a system to assure the quality of fresh produce. It was developed based on the concept of Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), Hazard Analysis and Critical Control Point (HACCP), Sanitary and Phytosanitary Measures (SPS), Quality Assurance (QA) and International Organization for Standardization (ISO) methods. The QMS was designed to give guidance to certification bodies to certify the on-farm production process of individual growers or produce marketing firms. The purpose of the QMS is to prevent, eliminate or minimize physical, chemical and biological hazards throughout the supply chain, so that produce is free of pests and is of acceptable marketable quality. The on-farm management system emphasizes both integrated pest management (IPM) and integrated crop management (ICM).

The components of QMS for on-farm production include:

- i) Quality Policy – This refers to the policy or vision of growers in the system. Normally, growers present their policy as “We strive to produce fresh fruits and vegetables for markets and processing and offer the best customer satisfaction”.
- ii) Quality objectives – Quality objectives are developed on the basis of customer requirements and are used as a guideline to establish a quality plan. The concept of quality objectives is to produce fresh fruits and vegetables to meet customer satisfaction, physical, chemical and biological safety, freedom from pests, and pesticide residues within acceptable limits.

- iii) Quality Plan – A quality plan describes on-farm practices required to provide quality fresh produce that meets customer satisfaction. Growers must follow practices as laid down in the quality plan in order to provide fresh produce in accordance with the quality objectives. Auditors can use the plan to audit the on-farm food quality programme. Customers can be sure that quality and safe fresh produce were produced.
- iv) Quality procedures – Quality procedures describe all operations such as procedures to obtain vegetables free of harmful microorganisms and pesticide residues, methods for sampling and testing, internal audits etc. required in the system.
- v) Work instruction – The work instructions are steps of on-farm techniques to ensure growers have clear directions to produce quality and safe fresh fruits and vegetables.
- vi) Documentation system – The documentation as per the system has to be maintained for individual crops. This is mainly because of the fact that processes for various components (e.g. type, time and quantity of pesticide application) of the cultivation system are different for different crops.
- vii) Forms – All practices indicated as critical control points in the quality plan must be recorded in the forms provided for the purpose of verification as well as trace back.
- viii) Checklist – Checklists can be used to supplement existing and auditing checklists used by certification bodies or internal audits carried out by groups of growers or grower clusters or individual business to assist in ensuring that all aspects are covered by farmers, producers, etc.

3.4 Good Agricultural Practices (GAP)

GAPs are “practices that need to be applied on farms to ensure food safety during pre-production, production, harvest and post-harvest. In many cases such practices also help protect the environment and safety of workers”. They are a collection of principles to apply for farm production and post-production processes resulting in safe and healthy food and non-agricultural products while taking into account economic, social and environmental sustainability. The system is an on-farm safety assurance system. GAP codes, standards and regulations are guidelines developed in recent years by the food industry, producer organizations, governments and civil society organizations to codify agricultural practices at farm level for a range of commodities. Their purpose varies from fulfilment of trade and government regulatory requirements, in particular with regard to food safety and quality, to more specific requirements of specialty or niche markets. In addition to facilitation of market access, reduction in non-compliance risks regarding pesticide residues and microbial and other contaminant hazards may be achieved. GAP schemes are predominantly consumer driven and incorporate traceability requirements as an important part of their food safety measures.

GAP guidelines lay down:

- i) precise conditions under which a crop should be grown, harvested and packed;
- ii) requirements for food quality and safety; and
- iii) guidelines for protecting the environment, labour force and sustainability.

The main challenges related to GAP implementation include an increase in production costs because of record keeping, residue testing, certification and inadequate access to information and support services. The types of costs include the cost of meeting a standard and getting certified and the cost of certification.

4. Development of GAP system in Thailand

The Government of Thailand has taken significant steps towards the development, introduction and implementation of quality and safety certification programmes, basically as a response to the quality and safety requirements of mainly export and to some extent domestic markets.

4.1 Why inspection and certification?

Inspection is the examination of food or systems for control of food, raw materials, their growing conditions, processing and distribution including in-process and finished product testing, in order to verify that they conform to requirements. It includes a review of various criteria such as documents, facilities and records that are related to inspection. The results are usually compared to specified requirements and standards for determining whether the item or activity is in line with these targets. Food is the most regulated commodity in the world. Inspection, appropriately carried out, is an assurance to the consumers that they are receiving safe food and its consumption will not result in food-borne diseases.

Certification is the procedure by which official certification bodies or officially recognized certification bodies provide written or equivalent assurance that those foods or food control systems conform to the requirements. A certificate is a written guarantee by an independent certification agency that the production process or the product complies with certain standards or norms. Such standards or norms can focus on environmental issues (e.g. soil conservation, water protection, pesticide use, or waste management), or social issues (e.g. producer income, workers' rights, occupational health and safety) or on other aspects of production like food safety. Certification is used to demonstrate that a product has been produced in a certain way or has certain characteristics complying with a standard. It is used mainly when the producer and the consumer are not in direct contact, for instance in the international market where the consumer cannot easily verify that the product was produced in the manner described by the producer. Certification brings opportunities to producers such as market access, protection of local resources, improvement of workers' health and living conditions of rural communities. It may also ensure consumer health. Consumers are becoming increasingly aware of the social and environmental problems associated with the production and trade of the food they consume. For example in Japan and the European Union, there is a booming market for products certified against certain private standards like Japan Good Agricultural Initiative (JGAI) or GLOBALGAP. European supermarket chains are increasingly demanding that their suppliers be certified against a private food safety standard like GLOBALGAP, denoting use of GAP.

4.2 Compliance costs of GAP certification in Thailand

According to a World Bank study carried out in 2004 on compliance costs in Thailand, an asparagus farm will initially spend US\$3 248 to set up the EurepGAP system and over US\$8 000 each for a British Retail Consortium and Hazard Analysis and Critical Control Point system. In addition to the cost of national accreditation to EN 45011 or ISO Guide 65, the cost to certification bodies for EurepGAP approval is approximately US\$2 000, whereas the farmer is charged for a certification license fee of US\$23.85 per certificate per year and US\$5.96 registration fees. Growers have to sign contracts with the export companies before implementing GLOBALGAP. Farmers are not able to implement the GLOBALGAP standard since they cannot manage the quality management systems by themselves. Thus it is not economical to implement GLOBALGAP on their farms. A way had to be found in Thailand in order to overcome these constraints.

4.3 Role of small farmers in Thailand

The main feature of Thai agriculture has always been small-scale farmers. It is estimated that there are over 9 million small farmers, using about 4 million hectares (ha) of land. The average landholding size is about 4 ha per family. Even holdings as small as 0.8 to 0.32 ha such those on which asparagus and baby corn are grown are exporting their produce. Most small producers have limited financial resources, insufficient knowledge of agricultural practices such as the proper usage of fertilizers and production planning, and no direct access to the market. The knowledge of small farmers in the correct usage of fertilizers and chemicals is limited. The improper or excessive usage of agricultural inputs such as chemical fertilizers and pesticides is well known to cause deterioration of soil and water and leave pesticide residues in foods.

The small farmers have to rely on large producers, exporters or national supermarkets for guidance, as a result of which they become dependent on those buyers. Small-scale farmers have the ability to utilize export market opportunities only if they are adequately informed, technically prepared and organized to meet new challenges with governments and public agencies playing a facilitating role. However, it would be difficult to mentor individual farmers. This has led to the concept of smallholder groups/associations.

4.4 Smallholders groups/association

Farmers of smallholdings form grower groups to achieve cooperation and coordination among growers. These groups monitor the farming practices and product quality of their members. Strong grower groups have the advantage that they are in a position to purchase inputs at lower costs because of collective purchases, can avail themselves of coordinated training and technical assistance and increase their bargaining power vis-à-vis manufacturers and exporters for increasing the farm-gate prices of their products. The proper functioning of groups of asparagus producers managed by pack houses and manufacturing exporters in the Western region is one example of the mutual benefits that can be gained by all those involved. By 1972 asparagus cultivation was reintroduced through the King's Hupkapong project in Phetchaburi. The project's aim was to set up a model asparagus production farmers' cooperative. Farmers living near the project area learned the cultivation techniques from project members and started producing and selling their produce for export via middlemen. Members of the cooperative, however, were experiencing problems because of the infertile soil and poor irrigation system, plus the presence of a number of pests and diseases that made operation costs very high. Without a definite market to absorb their produce and with competition from the neighbouring groups who were selling produce at much higher prices to middlemen for export, the cooperative failed.

In 1987 the Ministry of Agriculture and Cooperatives introduced high-value cash export crops to farmers to improve their revenues and also to promote diversification in agricultural production. In 1987 Taniyama Siam Company, a Japanese investor in Thailand, became the pioneer asparagus farm contractor when it sought the cooperation of the Ministry of Agriculture and Cooperatives to promote growing asparagus for export to Japan. In that same year, after conducting a feasibility study on asparagus' potential marketability, the Ministry of Agriculture and Cooperatives announced asparagus as one of the cash crops that would be promoted for export through contract farming. By 1998 there were five asparagus contract farming groups in Nakhon Pathom. A common feature of all asparagus exporters in Thailand is that most of their suppliers are small farmers whose cultivated areas of asparagus typically range from 800 to 1 200 square metres. In this system growers benefit from guaranteed high prices all year round, and on the other hand,

manufacturing exporters are assured of high quality and safe produce with guaranteed supplies. Contract farming is offered directly to the groups by pack houses and manufacturers/exporters. They also offer guidance for farming and accounting practices.

The private sector is also involved in terms of supporting smallholders and out growers with financial services and providing some advice. However, it is limited in its ability to transfer knowledge because of insufficient manpower. A good example is the creation of informal farmers' associations with the assistance of the TOPS supermarket chain. In these associations, professional growers within a family or village join forces and exchange experiences and farming knowledge. These groups seem to meet the preconditions for developing into fully-fledged growers' associations and may enjoy long-standing direct business relationships with retailers.

4.5 Individual versus group certification

Certification can be obtained by individual farmers as well as by a group of farmers. In the former category the individual farmer is inspected and certified and in the latter category a group of small farmers producing related crops is inspected and certification is provided to the group.

4.6 Types of groups and the group system

There are two types of group establishment. The first one is the group established by the farmers themselves who collaborate to grow the same kind of crops, and the second is the group established through the collaboration of the company that buys the farmers' crops. With respect to the data collection process of the groups, it was found that the group that was established through the collaboration of the company that buy crops from the farmers has a systematic data collecting process in which it is easy to retrieve the data. In contrast, it was found that the members of the group established by the farmers themselves usually lack adequate skill in data recording, as generally they have low levels of literacy and can only explain things orally.

Each group has a role to play. At first, farmers groups and the company make a mutual agreement concerning the crop production, including the kind of crops to be grown and the crop distribution. The farmers group thereafter produces the crop and the company supports it. The company also plays a role in appointing the farmers' leader, training farmers to comply with the company's practices, group management, and documentation assistance as well as setting up the rules within the group in order to get a product of high quality which meets their needs. For the internal audit, the company is responsible for the recruitment of auditors for all crop beds of farmers. Normally the employee of the company who is in charge of the field survey takes charge of the inspection interchanging between the plots under his/her responsibility and reports in the group meeting. After that they file the application to the government certifying body to perform the group inspection and certification. The assigned auditor will start the inspection of the group management system by examining the accuracy of documents stored at the group central office. After receiving information, he will audit only the sample farmers in the plantation according to the rules specified in the standard of the plantation sample selection.

4.7 Infrastructure for supporting inspection and certification

The Ministry of Agriculture and Cooperatives (MOAC), which is also in charge of food safety policy in the country, is the nodal ministry for agriculture that supports agriculture research and development. It has various departments such as Department of Agriculture, Department of Livestock Development, Department of Fisheries, Department of Agriculture Extension, and

National Bureau of Agricultural Commodity and Food Standards all of which are concerned with GAP certification. The NBACFS is the National Accreditation Body. Its functions include setting and certifying standards, auditing, and accrediting certifying bodies. The Department of Agriculture is the certifying body. Its functions include providing advice through the Department of Agriculture Extension, inspection, auditing, and granting of certificates/the national Q Mark.

The Department of Agriculture has the following four clusters. (In Thailand a group of institutions of government or geographically proximate group of companies and associated institutions in a particular field, linked by commonalities and complementarities is usually referred to as “cluster”.)

Cluster 1: Administration, which includes the Office of Agriculture Regulation (OAR), Technical One Stop Service Centre (TOSSC) concerned with GAP certification and other divisions such as Office of Agriculture Regulations and Information Technology Centre.

Cluster 2: Agriculture Production Science Services R&D Office (APSSRDO) and Post-Harvest and Processing R&D Office (PPRDO) concerned with GAP registration and other offices such as Plant Protection Research and Development Office, Agricultural Production Science Research and Development Office.

Cluster 3: Production R&D consisting of various research institutes such as Horticultural Research Institute, Field Crop Research Institute and other research institutions.

Cluster 4: Regional R&D offices – Office of Agricultural R&D (OARD). The Offices of Agricultural Research Development in the eight regions viz., OARD Region 1 (northernmost with eight provinces), OARD Region 2 (seven provinces), OARD Region 3 (northeastern region with ten provinces), OARD Region 4 (northeast middle with nine provinces), OARD Region 5 (twenty provinces), OARD Region 6 (northeast south eight provinces), OARD Region 7 (eight provinces) and OARD Region 8 (seven southern provinces) are responsible for registering farms, inspection for GAP certification and following up on the use of inputs on GAP farms.

A food safety committee operates in the Department of Agriculture, coordinating the food safety programme. It has the following four subcommittees:

- i) GAP certification – members include OARD and TOSSC.
- ii) Technical support – members include APSSRDO, PPRDO and OARD.
- iii) Coordination and information services – members include TOSSC, OARD, PPRDO, OAR and Information Technology Research Centre.
- iv) Implementation – members include PPRDO, OARD and APSSRDO.

The National Bureau of Agricultural Commodity and Food Standards (NBACFS) established in 2003/04 is the national regulatory body for food safety, focal point for conformance with international standards, especially for export commodities. In 2005 the NBACFS established criteria for the GAP production process and its product certification. The Bureau also sets maximum residue limits (MRL) for pesticide residues.

The Department of Agriculture Extension (DOAE) focuses on participatory development – farmer and community participation in learning and development, with extension personnel acting as facilitators and coordinators among state officials, relevant organizations, and farmers. Agricultural Technology Transfer Centres (ATTC) have been established at the subdistrict level

to serve as a coordinators and link activities of all relevant agencies and for training and support in the field through extension officers. The DOAE uses the training of trainers (ToT) approach to educate extension officers and volunteers; and Farmer Field Schools to educate farmers. The DOAE builds on earlier programmes in integrated pest management, which still is a main approach taken by extension officers. The Department of Agriculture Extension (DOAE) has the responsibility for farmer registration, giving advice and carrying out the first assessment whereas the Department of Agriculture in eight OARD regions, is responsible for field inspection, certifying the fields and following up the certified fields. The certificate is issued either on an individual basis or on a group basis. Individual certificates are issued to farmers operating individually, whereas the group certification is issued to farmers growing the same type of plants. In the individual certification every plot is inspected whereas in group certification, plots are inspected at random.

Thus in the inspection and certification activity, the Department of Agriculture is the inspecting and certifying body, the NBACFS is the accreditation body and the DOAE is the advisory body. It is envisaged that the government agency will play the role of certifying body during the early stages after which auditing will be done by a private institution in the near future.

4.8 Accreditation

Accreditation is the formal recognition by an accreditation authority to the technical and organizational competence of a conformity assessment body to carry out a specific conformity assessment tasks.

The National Bureau of Agricultural Commodity and Food Standards (NBACFS) is fully functioning as an accreditation body for the GAP programme in Thailand. In 2009, there were eight accredited certification bodies in the areas of GMP/HACCP, organic agriculture and GAP. The accreditation procedure for accrediting certification bodies for GAP certification by the NBACFS is as follows:

The Accreditation procedure for GAP certification by the NBACFS is as follows:

- i. Review all documents of certification body's (CB) system – system audit.
- ii. On-site visit to audit system – office audit.
- iii. Audit of the competency of CB – witness audit.
- iv. Decision on accreditation – done by accreditation review panel.

4.9 Levels of assessment of farmers for certification

Under the Thai scheme of Q GAP, farmers who apply for certification are assessed at the following three levels:

Level 1: Production processes for *safe products* (in particular appropriate use of agrochemicals).

Level 2: Production processes for safe and *pest free products*.

Level 3: Production processes for safe, pest free and *quality products*.

5. Principles and procedures of the group inspection and certification systems for small farmers

5.1 Principles or elements in the standards

The standard contains eight elements (or “principles”) with varying quality objectives as indicated below in table 1.

Table 1. Elements and objectives of the Q GAP standard

Sl. No.	Elements	Quality objectives
1.	Water source	Physical, chemical and biological safety
2.	Cultivation site	
3.	Use of agrochemicals	
4.	Product storage and on-site transportation	
5.	Data records	Trace back
6.	Pest-free products and occurrence of plant diseases	Freedom from pests
7.	Quality management in agricultural production	Customer satisfaction
8.	Harvesting and post-harvest handling	

For level 1 certification (safe products), only the criteria for the first five elements need to be met. For level 2 certification (i.e. safe and pest-free products) the pest-free criteria (element six) must also be met. For level 3 (i.e. safe, pest-free and quality products), all requirements (elements 1-8) must be met.

The various elements of the quality management system are indicated in table 2.

Table 2. Principles, criteria and assessments for quality management system

Principles	Criteria	Assessments
1. Water source	Water source not contaminated with hazardous substances and microbes.	Assess the environment – if possible risks exist, conduct water analysis.
2. Cultivation site	Land with no hazardous substances and microbes that may cause residues or contamination.	Assess the environment – if possible risks exist, conduct soil analysis.
3. Use of agricultural hazardous substances	If chemicals are used in production processes, instructions on labels, or instructions or recommendations by the Department of Agriculture must be followed. Chemicals must be used in accordance with the list of chemicals allowed by trading counterpart countries. Banned chemicals must not be used.	Check the storage of agricultural hazardous substances. Check the record of usage of agricultural hazardous substances, and, if in doubt, collect samples for residue analysis.
4. Product storage and on-site transportation	The storage must be clean, well-ventilated and protect products from contamination with foreign or hazardous substances, or disease carriers.	Check premises, equipment, containers and product transportation methods.

Table 2. (continued)

Principles	Criteria	Assessments
	Equipment and transportation vehicles must be clean, and not contaminated with hazardous substances. Product transportation must be carried out with care.	
5. Data record	Use of any hazardous substances must be recorded. Investigation of and termination of plant diseases or pests must be recorded. Management for quality agricultural production must be recorded.	Check data records and forms.
6. Production for plant disease- and pest-free products	Damage caused by plant diseases and pests must be investigated and must be treated if the damage at economic level is found. Harvested products must be free of plant diseases and pests. Those with plant diseases or pest must be isolated.	Check the records of investigation and treatment of plant diseases and pests. Examine the results of the isolated product.
7. Management of quality agricultural production	Practicing and managing according to the production control system Non-conforming products must be isolated.	Check the records of practice and management. Examine the results of the isolated products.
8. Harvesting and post-harvest handling	Harvesting at the appropriate period according to the production control system. Harvesting equipment and containers must be clean. The harvesting method must not affect the product quality, or cause any contamination and make the products unsafe for consumption.	Check the records of harvesting and post-harvest handling. Examine the equipment, container, procedures and methods.

5.2 Procedures of the group inspection and certification systems for small farmers

5.2.1 General

The Department of Agriculture can certify the origin of produce, according to the standards required under the GAP system, for the following: i) groups of farmers registered with relevant governmental organizations; ii) groups of farmers that are not registered but consist of at least five registered members; and iii) juristic persons (company or exporter authorizing and controlling the farmers/producers that produces for the group); or iv) independent agricultural organizations that have a minimum of two members growing the same crop.

Grower group certification is the group certification of the entire process from cultivation, processing to marketing the produce. Grower groups can be groups of growers, independent institutions, or juristic persons, in which the group will be certified and awarded with certification by the Department of Agriculture. Each member of the group will not be certified since group certification criteria will consider each member just as a supplier to the group.

The production category must conform to the scope of certification by the Department of Agriculture. The group leader must be certain that the group maintains the same process and administration. Plots currently certified with a particular crop cannot apply for group certification, nor can they apply for the same crop or the same plot. If the farmer or the corporation wants to apply for another group certification, the farmer or the corporation must cancel the current certification first.

5.2.2 Parties involved in the group inspection and certification systems

(a) Farmer groups: group of farmers that collaborate for the purpose of growing crops

A farmer/grower group has the function and responsibility of conducting the farm improvement and production procedures according to plant GMP. Also, the farmers need to monitor, take care and mindfully inspect their farms and their own production process under plant GAP. In cases where changes occur on the farm such as the replacement of any operational person, the farmers need to pay special attention to their work. If they are not sure whether the work will correspond to the system, they must ask the consultants for advice or ask the auditors for an inspection.

(b) The company that supports farmer groups

The company has the function and responsibility of providing support for production materials such as fertilizer and pesticide, equipment for production, monitoring the entire crop production process from planting to harvesting and evaluating the internal audit to comply with the GAP regulations as well as any agreements made with international trading companies that buy the crops.

(c) The certifying body

The certifying body consists of the certifying committee of the origin of the products and the auditors.

Responsibilities and procedures of the certifying committee include:

- i) evaluating the inspection;
- ii) approving and certifying the origin of the product - the Secretary of the Office presents the case to the Director of the Office of Agricultural Research and Development for approval and if the case is not approved, the Secretary of the Office will inform the auditors of the result and the reasons; and
- iii) controlling, directing, and ensuring that the certification process is carried out in a transparent manner up to the standards of the relevant parties with the possibility to back track.

Furthermore, the certifying body must be ready for inspection by the Department of Agriculture and local and international institutions, both locally and internationally.

Functions and responsibility of the auditors include:

- i. reviewing detailed information gained at the last certification;
- ii. preparing document for certification process;
- iii. conducting the certification process;
- iv. participating in the meeting to present the problems and recommendations and to answer questions of farmers before summarizing the result of each inspection; and
- v. preparing the report of the certification.

5.2.3 Responsibility of the group leader and internal control systems

(a) Responsibilities of the group leader

The group leader is responsible for defining the mechanism used to maintain the standard of production (internal control system) for the members to follow. Groups eligible for group certification must have established an internal control system and use the system to guarantee the quality of the group's production, and to make sure that members follow the requirements of the certification.

The group leader is obliged to inform the relevant governmental organization in the Department of Agriculture of any changes within the group, such as the number of group members, amount of production plots, or type of crops, for further inspection. He or she is obliged to make a written report along with the plan for solution to the relevant governmental organization in the Department of Agriculture if there is evidence of member farmers or suppliers failing to follow the regulations or conditions of the certification required by the Department of Agriculture.

During the inspection process for certification, the group leader cannot exempt or exclude members within the group with negative or possibility of negative inspection results or members that do not wish to be included in the group for inspection by the Department of Agriculture.

(b) The internal control system within the group

The internal control system within the group consists of the following parameters:

1) Contract/application form/agreement of the group with respect to requirements and conditions

- Members agree in the contract/application form to follow the GAP crop quality control system and the group's and the Department of Agriculture's requirements.
- Requirements consist of a) members' qualifications; b) members' responsibilities, including members' consent to be inspected by the group's internal auditor and the auditors from the Department of Agriculture for on-site inspection; c) members' production control plan; d) statement of penalty for members if they fail to follow the requirements imposed by the Department of Agriculture.
- In the event that the group employs the service of an external group or independent organization to carry out the internal control system, the group must submit the contract along with the documents mentioned above to the Department of Agriculture.

2) Training

Members are required to receive proper training on GAP crop quality control system, a copy of the GAP crop quality control system manual, a copy of the requirements imposed by the Department of Agriculture, and a copy of the group's requirements and conditions. The group can publish and distribute to its members – a summary document of the requirements and regulations that covers vital issues related to production.

3) Documentation and recording

The group's authorized persons examine and approve the documents before distributing such documents. All controlled documents must be stamped with the volume number and the date of validity. Obsolete or cancelled documents must be removed from the working area, but cancelled documents must be kept for reference and stamped as cancelled documents.

All records must be categorized into production seasons to facilitate inspection and referencing. Records relevant to production and quality control must be kept for at least three years consecutively to enable buyers to back track the records.

Group members' records must be kept with details such as name, address, location of plots to be inspected and certified, size of the plots, type of crops to be inspected and certified, group's production plan, estimated amount of produce of each member, production factors (for example seed or grain, fertilizer, and pesticide) that are allowed or not allowed by the group.

4) Complaint control

The complaint control system includes:

- receiving complaints from members regarding the production system;
- investigating the cause of complaints;
- specifying the solution;
- specifying the follow-up measures to be taken; and
- responding to the members who made the particular complaints.

5) Group's internal quality audit

The internal quality audit varies depending on the ethics and strength of the group. The group with members who have strong ethics tends to provide accurate and valid results. The strong group tends to have a well managed system and is ready for all aspects of the evaluation leading to a fast delivery of evaluation results. Mostly, the strength of the group is derived from the support of the company. Some criteria of the internal quality audit are as follows:

- The frequency of the internal quality audit should be at least once a year. The internal quality audit must cover the group's main administration office and all the group's plots being inspected and certified.
- The group must have an internal quality audit checklist for the internal quality control system and an internal quality audit checklist for members according to the GAP crop control system, and must keep records of auditing as evidence.
- Internal auditors need to have specific qualifications/requirements. For example, internal auditors can be from independent organizations contracted to do the job, or appointed officers in the group, or group members. Internal auditors, however, must have knowledge of the GAP crop quality control system and auditing techniques, and must have no beneficial interest in the persons being audited.
- Internal quality auditors must ensure that the group members follow the GAP crop quality control system and other requirements and conditions proposed by the group.
- The process of following-up the audit to solve problems must be in place. If problems are found in the main administration office of the group or in the members' plots, the group leader must investigate and resolve the problems to make sure the rest of the members are not affected.

5.3 Certification audit process

The external quality audit consists of the following steps: i) appointment of the auditors; ii) pre-visit; iii) prepare documents and schedule for auditing; and iv) audit.

A pre-visit is generally the first step. The Department of Agriculture representative will visit the group's main administration office and/or request the applicant to send the documents to the department. This action will precede the pre-visit for collection of primary information, assessing the efficiency of the group's internal quality control, assessing the risk elements in order to define the sampling size, and then recording the information contained on the pre-visit checklist.

The schedule, time period as well as number of auditors are then decided. Auditors are appointed. Documents are then prepared for the next step, i.e. to proceed with the audit as per instruction laid down. In the event that no non-compliance results are found, the auditor may submit the report to the certification committee with a request that certification be issued. In the case of non-compliance results being found, the auditor is to report to the group to allow the group to submit the plan to solve the problems along with the time frame. Once the problems are addressed, the group can reschedule for the next audit to pursue the certification. The following points are important:

- i) In solving the problems, the group must be sure to cover the main administration and each affected member's production process. However, the Department of Agriculture will cancel the application for certification if a member cannot solve the problems after three attempts. The group can reapply for certification when it is ready.
- ii) In solving the problems, the auditor team will only audit those issues of non-compliance, nevertheless, the team can audit other members in the group at random.
- iii) During the process of auditing for problem solving, the group cannot exempt any members from the audit, unless that member has resigned from the group or is dismissed from the group according to the group's requirements and conditions.
- iv) In the case that the member with problems decides to resign or is dismissed from the group according to the group's requirements and conditions, the Department of Agriculture will assign the auditor team to audit another member in the group as a replacement.
- v) In the event that the problems are effectively solved, but non-compliance to the GAP crop is found on other issues, the auditor team is to record the incidents for further follow-up inspection.
- vi) If the group is certified before the scheduled follow-up inspection, and the group wishes to add members or plots or make other changes, the group must report the changes to the Department of Agriculture who will arrange for the random inspection of the new members' plots or crops. Then the Department of Agriculture will amend the changes in the group's certification, but with the same validity.
- vii) After the group is certified and the group wishes to dismiss members or plots, the group must report the changes to the Department of Agriculture to amend the changes in the group's certification.

Follow-up inspection is to proceed with the instruction mentioned.

Follow-up inspection process includes random inspection of members that were not audited for the certification and consideration of the reports from previous audits and the group's correction plans and results. If there is evidence of not meeting the standards required by GAP or the requirements and conditions of the Department of Agriculture, the inspection team is to report the findings to the group to propose the possible correction plans and the time frame. The team will determine the appropriate correction plan and time frame for the group to follow. Problems

must be solved within two months of the date of the report. Then the inspection team will proceed with the follow-up inspection. If the problems persist, the inspection team will order the group to temporarily halt the use of the certification.

The details of various auditor requirements are indicated in **annex 1**.

5.4 Sampling during audits

During the assessment process, there will be random sampling of the products for quality analysis undertaken by an officer from the technical one-stop service centre or an officer from the OARD 1-8 may take random samples from the premises of packaging houses. There are various sampling requirements such as those for selecting the number of sample plots for inspection, collection of soil, water, fresh vegetables for toxic residues/microorganisms etc. which are mandatory for the group inspection and certification. For defining the sample size for inspection the following formula is used:

$$\text{Number of plots} = \sqrt{N}$$

where N is number of plots with the same plant to be inspected for certification.

The details are indicated in **annex 2**.

5.5 Structure and management of the group inspection and certification systems for small farmers

The groups' structures and managements vary from region to region, depending on local tradition. In some districts, farmers prefer to appoint the leader of a local organization such as the village leader to be their group leader. The group management tends to depend on the leader. Some parts of the production factors are supported by government budget. In other districts, a member farmer of the group is appointed to be a group leader and the group management tends to be under the group committees. Consequently, auditors need to clearly understand the internal management of groups for the evaluation.

The structures and managements of groups also vary depending on the kinds of crops grown. For the marketable and better-priced products such as asparagus, the group structure is strong, as the group internal management is efficient and at the same time the group is ready to comply with the requirement. The evaluation process tends to be accomplished quickly and most of them pass the certification. On the other hand, for the produce that do not find ready markets (e.g. spinach) or crops that are not in demand for export with their price fluctuating severely, organizing a group is difficult and it is unstable according to the changeable needs of their crops. The internal management seems to be unsystematic. There are always problems of recruitment and resignation of members. The new members do not clearly understand the requirements, and consequently it makes the evaluation process time-consuming and the group is likely to have less chance of getting certified.

5.6 Laboratory analysis, facilities and agencies responsible for analytical inspection

Microbiological and pesticide residue analyses are carried out in the DOA laboratories. The microbiological analyses of fruits and vegetables include those for *E. coli* and *Salmonella* and are important for export. Some type of risk categorization is considered. Medium risk vegetables

are those ready to cook, while high risk vegetables are those ready to serve. Eight ready to serve vegetables are exported to EU markets and are subjected to these analyses. The 23 kinds of vegetables subjected to random sampling for microbiological contaminants prior to export to Norway, Iceland and EU are coriander, parsley, holy basil, sweet basil, *pak kayang* (rice paddy herb), mint, *praew* leaves (*Polygonum odoratum* Lour), spring onion, celery, Chinese chive leaves and flowers, acacia, lemon grass, morning glory, *pak wan* (*Melientha suavis* Pierre), yard long bean, asparagus, bird chili *pak pang* (night shade).

The DOA reported that in 2004 out of 2 310 samples of mangoes, 10.7 percent had residues that were over the MRL limits. As a result, mangoes exported to Japan were quarantined and strictly checked for residues. The fruits and vegetables that are subjected to random sampling for pesticide residue analysis prior to export to Japan, Singapore and the EU are mangosteen, durian, mango, litchi, longan, pomelo, okra, asparagus, ginger, chili in addition, before export to Japan, the vegetables analysed for pesticide residues include Chinese celery, kale, dill, sweet basil, holy basil, hairy basil, coriander, rice paddy herb, penilla, pepper mint, centella or pennyworth, sweet peas, collard, acacia, leech, lime, water mimosa, lemon grass, and *pak ped* (*Ahernanthera sessilis* DC).

Inspection and analysis is done to adhere to the laws or conditions set by the importing country including the requirements of the buyers.

Parameters to be analysed at packing houses/before export include:

- Microbiological analysis: standard plate count, total bacterial plate count, total yeast and mould count, coliform bacteria.
- Nutrition analysis i.e. nutritional constituents and food labelling of nutritional values.
- Chemical mixtures: benzoic acid, sorbic acid, sulphur dioxide.

Parameters to be analysed at farm level include:

- Soil: plant nutrients, chemical contamination.
- Water: pH, waste contamination.
- Fertilizer: plant nutrient, chemical/physical properties.
- Crop: phytosanitary, pesticide residues.

The agencies responsible for analytical inspection in the Central area are:

- i) The Agricultural Production Science Research Development Office .
- ii) Post harvest Products Processing Research and Development Office.
- iii) Plant Protection Research and Development Office.

Otherwise, the Office of the Agriculture Research and Development in regions 1-8 is responsible for inspection.

5.7 Traceability

Traceability or product tracing is the ability to follow the movement of food through specified stages of production, processing and distribution. It also enables efficient recall in case of product contamination. Furthermore, it helps to determine the origin of a food safety problem, comply with legal requirements, and meet consumers' expectations for the safety and quality of purchased products. Farmers should have a good trace back in order to know the source of food-borne disease outbreaks.

A Dutch study on traceability system for smallholder agricultural products within the governmental certification system revealed that traceability by the Department of Agriculture is done through sampling and through the Q mark number managed in the certification system on GAP and GMP. The vision of DOA on traceability is that it is a tool to assist in the food safety system and is not included in the Thai regulation. Traceability in the meaning of monitoring of the product flow itself (tracking) is not practiced, though codes are in place that make it theoretically possible. Information is usually exchanged when a red alert arises. Tracing upstream takes place on the basis of export documentation delivered by the private sector (exporters), which relate to governmental databases in which farmer plots are registered. The Q mark number is managed throughout the supply chain (depth), linking to the farmers and their GAP (breadth).

Traceability by market actors is most refined in the case of exporters, who organize tracking of the product flow throughout the supply chain from (contract) farmers up to export. Not only is the product itself monitored, but also the origin of inputs (seed, chemicals), packaging and processing (breadth). Traceability tests are performed both for internal and external use. Tracing back is possible in one to two hours, thus reducing recall time for products by about three days. On the local markets products are rarely separated and monitored for traceability, as there is no market demand for the same.

There are a number of traceability documents. Documents used in production, harvesting and selling of farm produce provide a record of what has been done. Documents should be able to communicate clearly information to workers and customers. These documents need to be user friendly, easy to understand, accessible, up-to-date, and relevant to the situation. Other required documents include personal hygiene instructions, cleaning and pest control plans, chemical inventory, spray records, fertilizer and soil additives, and risk assessment records. Farmers need to be aware of the latest MRLs set by the country or international organizations. An action plan should be considered when the MRLs are exceeded. Post-harvest records, record of training and training needs should be filled or completed and readily available. With proper documents and records system, products can be traced back and forward so that providing necessary information to the consumers will be easy. Examples of records and labelling schemes are: identification of each separate production by batch, code, name, record of production site, date of supply and destination.

Information technology for food safety and trace back has been developed in Thailand to visualize and control the outbreak of avian influenza disease since 2003. Information management of the fruit supply chain was commenced in 2006 for durian and mangosteen to help manage the logistics system of fresh produce and to support the development of a trace back system. During 2010, the company Neoinventions announced that Neotrace – a food traceability platform that provides instant access to farm of origin, processors and distribution channels is available. It can also provide comprehensive bulk level traceable solutions. However, the applicability of these systems for farm level production systems is yet to be proved.

6. Infrastructure including personnel and finance

6.1 Personnel

GAP training and advisory services for individual growers and grower groups are provided by the Department of Agricultural Extension under a memorandum of understanding with the Department of Agriculture signed in 2007. The staff members of the DOAE are insufficiently trained on the GAP system; the responsibility is often transferred to the Department of Agriculture. The DOA provides internal training to their staff to prepare them to work as GAP advisors and inspectors so that they understand the concept of quality management system, as well as quality and GAP issues specific to each crop. The inspectors need to be trained in risk assessment. To this end basic curricula should be developed for them as well as for independent advisers and inspectors.

There are over 700 inspectors involved in the GAP certification programme. For training GAP inspectors, a four-day training course is organized. Every three to six months four-day refresher training courses are organized. For training GAP volunteers two-day training courses are organized by inspectors. The inspector: GAP volunteer: grower ratio is 1:25: 1 250.

Under the FAO project “Strengthening compliance with the SPS requirements for expanded exports of fresh and processed fruits and vegetables” TCP/THA/2903(T) and TCP/THA/3104, which was completed in 2009, a training of trainers workshop was organized during 2004 for senior inspectors, food processors and packers’ representatives. A new comprehensive inspection manual for both fresh and processed fruit and vegetables products for export was prepared under this project.

The purpose of the manual was to provide concerned government inspectors with a tool to inspect packing houses, distribution centres, manufacturing establishments and fumigation plants. The following subjects were included in the manual:

- the registration application and process;
- the inspection protocols;
- export product sampling, analysis and certification application process;
- hygiene practice inspection guidelines;
- manufacturing control inspection guidelines;
- inspection of labels for economic fraud;
- networking with other department and ministries;
- a description of GAP and HACCP systems; and
- programme audit.

6.2 Training needs of growers and extension personnel

The growers need training in various aspects such as pesticide management, traceability, and record keeping, farm business management skills, sound environmental and social practices, basic food hygiene and sanitation, post-harvest management, certification procedures. The aspects the extension personnel need to know include GAP principles, IPM and integrated crop management, food regulation, market requirements for exports, packaging and post-harvest technologies, laboratory analysis practices, sampling, traceability procedures, GAP auditing and market information systems.

6.3 Financial aspects

The government subsidizes the cost of the inspection and certification system. Each auditor will receive a per diem allowance according to the official rate established for travel of government employees. Government allocates a budget of 1 000 baht for inspection per plantation bed. The budget cannot be set by group since each group varies with regard to their number of members, number of the plantation samples, etc. The rate the members pay to their group, either directly or indirectly, for group management aspects will vary according to what each group agrees. The government bears the expenses for the sampling of soil, water and plant by auditors for analysis purposes to support the certification system.

An example of the budget for the group inspection, including the management inspection at the central office of the group with a three-day schedule and three auditors is in total about 10 000 baht, broken down as follows:

- per diem allowance of 210 baht/person/day for 3 days = 1 890 baht
- accommodation cost of 1 000 baht/person/day for 2 days = 6 000 baht
- the cost of gasoline for two ways = 2 000 baht.

Besides the above expenses, there is the expense for plantation inspection at the land being farmed by the group members. The total expense then depends on the number of plantation beds to be inspected and the distance between them. For government inspection, the government bears the expense, whereas the group bears the expense in the case of an internal quality audit.

6.4 Information resources and data storage

The data concerning the inspection and certification system of the Department of Agriculture are stored in the computer system. These include:

- i) the basic data related to the applicant applying for inspection and certification such as the ID code, name of the applicant, address, code of the plantation bed, address of the plantation bed, types of plants, the area of production, date of application;
- ii) inspection information related to the auditor such as the ID code, name of the applicant, address, code of the plantation bed, types of plants, number of inspection, date of inspection, name of the inspector;
- iii) the information presented for the certification to the committees such as name of the applicant, the ID code, code of the plantation bed, types of plants, number of times presented to the committees, date of presenting to the committees, type of the inspection; and
- iv) the information on certification such as the ID code, name of the applicant, code of the plantation bed, types of plants, duration of the certification, the issue date and expiry date, number of times presented to the committees. Record forms filled in by the auditors can be retrieved via the database.

The inspection and certification system databases of the regional agencies of the Department of Agriculture scattered throughout the country are centralized at the Department of Agriculture's central IT Centre and are accessible on the Department's Website.

6.5 Infrastructure and equipment for group inspection and certification systems

A kit for inspection in the forms of a manual, other documents and sampling equipment has been prepared to systematically facilitate the process and is adequate for working. The vehicles needed for inspection are limited since they are shared with other departments/activities and this is an obstacle for the inspection system. Laboratory equipment for sampling is available as is a vehicle for transporting the samples to the laboratories. Some types of sampling require contact with the laboratory in advance so that they can be prepared for the analysis. The contact is done via the mobile phone, which is convenient and fast. A database system has been set up in which the samples sent to the laboratory are recorded and the results of the analysis are entered into this directly. Laboratories are located throughout the country.

6.6 Interdependencies in the group inspection and certification systems among the producers, food enterprises and the consumers

The food enterprises are willing to buy products from farmers that are certified by the Department of Agriculture since they can be assured by the standard certification system of the safety of products, i.e. assured that they are free from pesticide residues. The consumers too are assured through the independent inspection system of the safety and quality of fresh fruits and vegetables.

7. Various systems of GAP

GAP codes, protocols, standards or regulations are guidelines which have been developed in recent years by the food industry, exporters' or producers' organizations, governments or others, aiming to establish GAP at farm level for a range of crops. Although food safety is a primary objective of most GAP codes, not all codes put equal emphasis on environmental protection and the safety of workers. GAP standards are being set by both the private sector and by governments. Some highlights and comparisons are given below.

7.1 National Q GAP

The National GAP scheme for agricultural production (Q GAP) has been established by the Department of Agriculture, Ministry of Agriculture and Cooperatives (MOAC). National GAP standards have also been developed for livestock and fisheries by the Departments of Livestock and Fisheries respectively. The government had established general GAP control points and compliance criteria for fruits, vegetables, herbs, grains and other food products. Specific criteria have been established for each crop to be used together with the general standard. These criteria constitute a kind of guideline for GAP and a manual for growers, indicating which chemical agents are allowed or not allowed.

Besides the set of regulations for GAP for the production process and production certification, MOAC also has a GAP logo, namely the Q mark. The farmers who fulfil the requirements of the national GAP standard can label their products with the Q logo. Q represents a mark of quality and is green in color. The Q mark is a legal registered certification mark issued by the certifying body in accordance with the procedures of a third party certification system for products certification and is in conformity with the requirement of GAP standards and ISO/IEC Guide 65: General requirements for bodies operating product certification systems. The regulations associated with the Q mark are based on the rules set out by NBACFS. Basically, the Q mark indicates that the product displaying it is of high quality and is safe for consumers. The mark

also conveys an important message to domestic and overseas consumers, namely to have confidence in the quality and safety of products produced under the GAP process. To foster the use of a single Q mark, there are eight organizations under MOAC including DOA, DOF (Department of Fisheries), DLD (Department of Livestock Development) and a few private organizations with whom NBACFS has signed a memorandum of understanding that authorizes them to allow producers to use the Q mark based on inspection and certification of their production process at farm level to ensure compliance with the Q GAP processes and norms. MOAC has also set out the criteria for product certification under GAP. The code labeling of five groups of code numbers with a total 20 digits appear in close proximity below the Q mark (see figure 1). The code numbers enable tracing back up to the farm.

The NBACFS criteria for GAP for the production process and its product certification (TACFS 9005-2548) are as follows:

- The primary production process at farm level has to be completed according to the rules as set out in the national standard for GAP and inspected and certified by an authorized certifying body.
- The production process, including packing house or slaughterhouse (if any), has to be in conformity with GMP/HACCP requirements and certified by authorized certifying bodies.
- Operators allowed to use the Q mark must observe procedures for recalling products, if necessary, and for complying with the traceability requirement.
- Products using the Q mark should have been tested for their essential quality and analysed for chemical residues, contaminants or other hazardous materials.
- For products not yet included in the list of Agricultural Commodity and Food Standards, other international standards may be used upon the approval of National Committee on Agricultural Commodity and Food Standards.



Figure 1. Q logo

Q Certificates

Thai Q certificates are issued for GAP, GMP, HACCP, food safety, fumigation, distribution and retailing by the Ministry of Agriculture and Cooperatives. Within the Ministry of Agriculture and Cooperatives, the National Bureau of Agricultural Commodity and Food Standards (NBACFS) is responsible for the development of the Q certification programme for all the commodity departments (DOA, Department of Fisheries, Department of Livestock Development).

The certificates issued by the Department of Agriculture at different phases of the supply chain include:

1. Certificate for the production site at farm level (GAP).
2. Certificate for the grading/packing house (GMP).
3. Certificate for the agroprocessing house (GMP/HACCP).
4. Food safety certificate.
5. Certificate for the fumigation plant (Q-Fumigation Plant).

6. Certificate for the distribution centre (Q Distributor).
7. Certificate for the distribution outlets for agricultural inputs (Q Shop).
8. Certificate for the quality agricultural inputs (Q product).
9. Certificate for the seed multiplication areas.

The Q mark certification refers to different certifications/inspections by the DOA, at different phases of the supply chain:

- i) Q GAP (farm level)
- ii) Q packing house
- iii) Q processing establishment
- iv) Q fumigation (sulphur dioxide/methyl bromide)
- v) Q pesticides distribution (chemical distribution shops).
- vi) Q food safety (which can be granted to a packing house or processing establishment with their own relevant Q certification and using inputs from contract growers with Q GAP certification, provided that their products are found to have conformed with food safety requirements for three months).

Guidelines on the use of the Q mark

- i) The type of Q mark used is as specified in the notification by the Department of Agriculture.
- ii) Only certified operators by the Department of Agriculture, Ministry of Agriculture and Cooperatives have the right to use the Q mark.
- iii) The name of the certified establishment and the certification number should also appear on the Q mark.
- iv) The Q mark should be used only to show the contact details about the company, and only for advertisement and market promotion. It should not be used for other purposes aside from the scope of the certification as this could result in confusion as to the scope of the certification.
- v) It is prohibited to show the Q mark on the product or packaging as that would imply that the product is certified.
- vi) It is prohibited to use the Q mark for whatever purposes, during suspension, cancellation, withdrawal, and expiration of the certification.
- vii) The Department of Agriculture, Ministry of Agriculture and Cooperation, reserves the right to specify the validation date for the Q mark, and has the right to withdraw the Q mark without prior notice.

The certification programme appears to be useful (with its logo). The Thai inspection and certification programme is carried out centrally in Bangkok – export product certification is done by the Technical One Stop Service Centre (Ministry of Agriculture, Bangkok) and inspections of establishment and Q certifications are done by the Post-Harvest and Processing R&D Office (PPRDO). The reports on the activities of these programmes are recorded manually.

Q Mark Numbering System

The Q mark number consists of 5 codes:

AC – XX – XX – XXXXX – XXXXXXXX - XXX

For example a farm of bean yard will have the following number AC – 03 – 02 – 3716 – 0767 – 352

Code no. 1 Certification body – DOA – 03

Code no. 2 Type of Certification – GAP– 02

Code no. 3 Standard certified – Group of crop – 3716

Code no. 4 Company/exporter/farm – 0767

Code no. 5 Name/kind/type of commodity – crop – 352

Fast track certification is for those exporters who have both GAP certification for their produce and GMP for packing and processing. Fast track certification means less sampling of any produce to be exported.

The registration application for establishments and the process is shown in **annex 3**.

7.2 Thai GAP

The system and certification mark under National Q GAP was not internationally benchmarked. In order to create a standard that may be benchmarked internationally, Thai GAP was developed. Thai GAP, a voluntary private sector standard for safe and sustainable Thai farm products such as vegetables, livestock and fisheries, was officially certified in May 2010, as being equivalent to the GLOBALGAP standard. The Thai GAP standard assures the food safety and quality of upstream operations, from seeding to finished products, and the welfare of farmers that helps promote sustainable Thai agriculture. Thai GAP is a product of collaboration of various governments and private agencies, including the Board of Trade of Thailand (BOT), National Food Institute (NFI), Office of Small and Medium Enterprises Promotion (OSMEP), Thai Fruit and Vegetable Producer Association, Kasetsart University, National Metrology Institute of Germany (PTB) and German Technical Cooperation (GTZ). The information is in Thai language and it is easy for farmers to understand. The standard is meant to reduce both implementation and certification costs, when compared to GLOBALGAP. There are about 900 certified producers in Thailand. The Thai GAP committee is now in the process of forming a certification body and has selected auditors to check the farms and operations of applicants. The Thai GAP project will start with fruits and vegetables that have been barred from entry into countries where the high quality of goods and environment-friendly farms and operations are insisted upon. Shrimp products are next on the list.

Thai GAP will facilitate smallholder certification in the form of group certification against the benchmarked standard. Certification will be the responsibility of independent and duly registered certification bodies. Thai GAP will focus on the major markets, in particular China, Japan, Australia and the EU. It is expected that Thai GAP will build confidence in the quality and safety of Thai products in domestic and external markets, create and support clusters of small growers, establish a national quality standard for agricultural produce equivalent to the high standards GLOBALGAP and SPS requirements, create a traceability system, develop awareness about food safety, reduce the costs of production and compete in world markets, reduce the cost of

quality and safety testing of agricultural products as well as assure the safety and sustainability of agricultural production.

Work is in progress for:

- setting up the Thai GAP governance and legal structure;
- establishing the National Technical Working Group;
- developing National Interpretation Guidelines of the standard for farmers and exporters;
and
- developing the Benchmarking Cross-Reference Checklist.

7.3 National Q GAP versus Thai GAP

In 2006 there were different viewpoints on the role of the government in food safety certification. From the viewpoint of the private sector (exporter), inspection and certification are best left to the private sector, which needs to follow market requirements, and the government should limit itself to public education (including training of farmers), policy development and enforcement. On the other hand, the general viewpoint of the Department of Agriculture was that Thai GAP certification by the government also has farmers' access to markets as the main goal, making facilitation of commercial relations by the DOA necessary. DOA was also of the opinion that Thai GAP was a trademark of the Thai government.

7.4 GLOBALGAP

GLOBALGAP referred prior to 2007 as EurepGAP, is a certification system for agricultural producers and exporters worldwide who seek to sell their products to retailers within the EU. It was originally created by a group of European supermarket chains. GLOBALGAP aims to increase consumers' confidence in food safety by developing GAP that must be adopted by producers. The focus of GLOBALGAP is on food safety and traceability, although it also includes some requirements on worker safety, health and welfare and conservation of the environment. GLOBALGAP is a pre-farm gate standard, which means that the certificate covers the process of the certified product from before the seed is planted until it leaves the farm.

The main requirements include producers' establishing a complete control and monitoring system. Products are registered and can be traced back to the specific farm unit where they were grown. GLOBALGAP rules are relatively flexible about field practices such as soil fumigation and fertilizer usage. There are strict regulations about pesticides storage and pesticide residue limits. In addition it is important to record and justify how the product was produced, so detailed records must be kept about farm practices. GLOBALGAP, the organization, does not issue the certificates itself but it has authorized registered certification bodies to do so. Farmers who have to get GLOBALGAP certification have to pay for registration, inspection and certification. In addition to the certification fee charged by the certification agency, the producer must pay an annual producer registration fee to maintain the certification. Both individual producer and groups of producers can apply for certification, the costs of which depend on the certification agency chosen and the time spent on the inspection.

To get the GLOBALGAP certification, the producer or group of producers need a complete administrative system to keep track of all farm activities. This requires a sufficient administrative and financial capacity.

7.5 National Q GAP versus GLOBALGAP

Though many requirements of the National Q GAP are similar to GLOBALGAP, there are differences such as the legal ownership, the certification process, issues covered and the details of the requirements. GLOBALGAP has generic control points and compliance criteria for all fruit and vegetables, emphasizes record keeping and documentation, paid third party audits and inspections, and covers workers welfare and environmental issues. On the other hand, besides fruit and vegetables the National GAP covers, herbs, grains and other food products, it places little emphasis on documentation, it provides free audit and inspection services by government officials, free laboratory analysis for soil testing, microbiology and pesticide residue analysis and free training – all to assist farmers in complying with the National GAP standard and obtaining certification.

7.6 ASEANGAP

ASEANGAP was developed in 2006 by the ASEAN Secretariat with assistance from Member Country representatives as a standard for GAP during production, harvesting and post-harvest handling of fresh fruits and vegetables in the ASEAN region while taking into account economic, social and environmental sustainability. The purpose of ASEANGAP is to enhance harmonization of national GAP programmes within the ASEAN region, enhance the safety of fruit and vegetable for consumers, the sustainability of natural resources, and facilitate the trade of fruits and vegetables regionally and internationally. The ASEANGAP covers fresh fruits and vegetables including herbs, but not high risk products such as sprouts. It consists of four modules, namely food safety, environmental management, worker health, safety and welfare and produce quality. Certification is carried out by the national authorities in each of the ASEAN countries. Work on the regional strategy to facilitate the implementation of the ASEANGAP for fresh fruits and vegetables has been in progress since 2009.

Since the ASEANGAP is intended to enhance harmonization of product standards and facilitate trade there are great opportunities for certified producers to enhance their exports of fresh fruits and vegetables to other ASEAN countries. For the less developed ASEAN countries, there is an opportunity to use ASEANGAP as a benchmark in developing national GAPs, as the ASEANGAP includes implementation guidelines and training materials as well as a code of recommended practices. Member countries can benchmark their country GAP programmes against ASEANGAP to achieve harmonization. A five volume Interpretive Guide for ASEANGAP for production of fresh fruits and vegetables has been published by the ASEAN Secretariat, Jakarta, The five volumes are i) ASEANGAP; ii) Environmental Management Module; iii) Food Safety Module; iv) Produce Quality Module; and v) Workers Health, Safety and Welfare Module. More information can be obtained at the Website www.aphnet.org/gap/ASEANGap.html

8. Opportunities and constraints

8.1 Constraints of the group inspection and certification system

The constraints on the successful implementation of the group inspection and certification system are described in the following paragraphs.

- i) Insufficient organization of small growers in producer associations: there are only a small number of groups of growers that facilitate the effective implementation of GAP by small growers. Most farmers do not show interest in gathering together as groups.
- ii) Subsidization of pesticides: The tax structure related to pesticides encourages more use of chemicals than other inputs. Since 1991, pesticides have been exempted from import duty, business and municipal taxes.
- iii) Shortage of skilled labour: The shortage of skilled labour is becoming a problem as people migrate from rural areas, thus prompting farmers to resort to certain labour-saving practices such as increased consumption of herbicides.
- iv) Constraints on the evaluation of the internal quality audit: There is a lack of knowledge and skills in conducting the evaluation according to the rules and regulations. There is the burden of expense on group members for the internal quality audit. There is a lack of ethics in the evaluation process.
- v) Lack of government personnel to conduct the evaluation: This includes both an inadequate number of officials and a shortfall in terms of capability. The officials are required to do various work apart from the certification work and thus are extremely burdened. Although all officials have been trained through the same course and according to the same standards, they possess different levels of skills and capabilities.
- vi) Inadequate financial support: the number of vehicles available for the work is limited because of financial limitations.
- vii) Obstacles for information collection: There is huge amount of data but a small number of officials in charge of the information.

8.2 SWOT analysis

Strengths

- i) Group expresses an interest in group inspection.
- ii) Group formed with a company has strong internal control system.
- iii) Group formed with a company has sufficient funds.
- iv) Reduced budget with group inspection.
- v) Faster inspection process.
- vi) Group formed with a company has systematic records.

Weakness

- i) Grower group tends to have weak internal control system.
- ii) Lack of understanding of the group inspection process.
- iii) Expense in setting up internal control system.
- iv) Lack of experience in management.
- v) Inappropriate workplace.
- vi) Complicated inspection rules and regulations.

- vii) Difference in skill and judgment capabilities in different inspectors.
- viii) Insufficient number of inspectors.
- ix) Lack of compatibility between database systems.
- x) The Ministry of Agriculture has multiple roles of providing advice, acting as certifying body and accrediting body.

Opportunities

- i) Government policy to promote food safety.
- ii) Regulations and announcement from Department of Agriculture on exporting fruit and vegetables.
- iii) Continuous budget/support from the government on certification inspection.
- iv) Exporters' demand for certified produce.
- v) Increase in consumers' health and safety awareness.
- vi) Commercial sanction.

Threats

- i) Insufficient campaign to promote group certification.

8.3 Suggestions for the future

- i) Promote and support group setup among farmers, promote participation of private sector, provide training to farmers on group certification inspection. The groups need to implement a quality management system with an internal control mechanism.
- ii) Provide training to officers on group inspection, increase the number of inspectors, promote awareness on group certification and inspection systems.
- iii) Increase database compatibility, develop documentation system.
- iv) Promote widely the implementation of food safety measures from farm to table. These measures include GAP for the agricultural producers, HACCP for the processors, Quality Management Systems for the entire food production chain (farm to processing).
- v) Strengthen food regulatory monitoring and enforcement programmes – to ensure that regulatory measures are carried out as intended, monitoring is necessary.
- vi) Increase the availability of laboratory services – to be able to monitor the safety of the food products in the market, and assist, particularly, the small and medium-scale food sector to comply with sanitary requirements, more laboratory services should be established.
- vii) Follow and disseminate pertinent local and international food developments to all involved – to keep everyone in the food business informed and aware of the pertinent developments and concerns in the food area, regular dissemination of information should be promoted.
- viii) Provide or facilitate training relevant to quality food production management – to improve the capability of the food sector in implementing quality production management, short training courses with practical exercises should be provided.
- ix) Promote research and development – to assist entrepreneurs to stay in compliance with ever increasing stringent international regulatory requirements, research should be done to develop more sensitive and accurate diagnostic tests for contaminants, less chemical dependent farming techniques, and disease-resistant plant varieties.

Auditor requirements

The auditor must have completed the auditors training course and be licensed by the Department of Agriculture to conduct inspections. Each inspection must consist of the following persons: a lead auditor and not more than three auditors. In some cases, the services of experts or observers may be required to act as consultants or to assist the auditors. This should be not more than three persons. Up to now, there are about 1 125 qualified auditors according to the regulations of the Department of Agriculture.

For the specialized training course, the trainees are required to pass a test on the rules and regulations related to the mission of an auditor, the inspection checklist, the assignment of objectives, preparation of a production control plan, the control crisis points and the forms for inspection. This normally lasts two days. They are required to pass a test after receiving practical training in plantation inspection skills. Again this lasts two days.

An auditor must at least be a graduate from high school or equivalent. An auditor must be trained according to the general requirements of the GAP system. The auditor must also be trained in the lead auditor/auditor course which should have at least 40 hours of training in quality auditing by an internationally recognized institution or equivalent.

Auditors with a Bachelor's degree must have at least four years experience (not including training). Those with a vocational or high vocational diploma must have at least five years experience (not including training). Those years of experience must be from working in an occupational field, technical field, or management field that involves decision-making, problem solving, and communicating with personnel in a management field, or customer service, including the stakeholders. The position must have been involved with the following activities (preferably all), which promote learning and understanding: system management related to production, harvesting, processing, crop industrialization, standardization, permit issuing, registering, crop-related analysis, research and development, production promotion, or crop-related servicing.

Auditors must have at least 20 days experience in auditing and assessing standards in crop production or equivalent in a related field as a trainee under the supervision of the lead auditor appointed by the Department of Agriculture. Auditing experience includes preparing for the inspection, actual inspection at a farm (either to certify or to extend the certification validity) that covers all regulations of the system, and also participating in making, approving, and distributing auditing reports according to ISO 19011 section 6.3-6.6 within the last three consecutive years. Auditors must have general and in-depth knowledge and skills.

The personal characteristics required for the auditors are that they must have a respectable character and ethics, be open-minded, resourceful in communication, observant, adaptive, decisive, practical and rational, highly self-confident, visionary, and understanding about duties and limitations of the farmers or entrepreneurs. Auditors must not have any relationship – directly or indirectly – with the persons being inspected for two years prior to the inspection, and they must not have consulted with or given in-house training to the persons being inspected for two years prior to the inspection.

A government official who is an auditor will receive extra allowance besides his/her salary. The allowance depends on the salary he/she is currently receiving. Private employee auditors will receive remuneration for inspection depending on their wages. In comparison private employee auditors are better remunerated than government officials who are auditors.

Sampling requirements

A-1 Calculation of plots to be sampled

The sampling process will consider the risk elements of each group and also follow the sampling requirements.

Important factors used in calculating the number of sample plots and the group's risk elements are as follows:

Criteria used in calculating the number of sample plots:

Inspecting for certification	= \sqrt{N}
Inspecting for follow-up	= $0.6\sqrt{N}$
Inspecting for extending validity	= $0.8\sqrt{N}$

where Y = No. of sample plots

N = No. of plots with one type of crop being considered.

The results should be rounded off to the nearest whole number.

For all of the above criteria, if risk elements are found during the on-site inspection, the result of the calculation should be multiplied by 1.5.

High risk is considered if there is an unreliable internal control system such as i) lack of internal quality audit plan; ii) lack of internal quality audit on every plot in the group; iii) unqualified internal auditor(s); iv) evidence of repeated errors in the same area or lack of contingency plan; v) difference in the results from internal quality audit and the actual audit; vi) member farmers not provided with GAP quality control manual; vii) lack of document/record control system; and viii) lack of internal control system revision by the group leader or high value of residue or contamination from the inspected plots or the crop, such as chemicals, microorganisms, heavy metals, etc.

The sample plots are chosen according to the results of the internal quality audit:

- i) 75 percent of the sample plots are chosen from plots with high risk elements, based on the following information:
 - internal control system results or analysis results (if any) for the particular field showing defects with ineffective measures or no apparent measures taken to fix the defects;
 - plots for which complaints have been received in that year;
 - plots with inspection results or analysis by an external organization showing defects in that year; and
 - new plots or plots with no record of prior inspection.
- ii) 25 percent of the sample plots are chosen at random.

The Department of Agriculture reserves the right to modify the ratio used in choosing the sample plots and the appropriate number of plots but not less than the amount of sample plots.

A-2 Sampling, sealing, storage and transportation of samples to laboratories

A-2.1 Sampling method for toxic residues analysis

The sampling method should be done by scattering around the plantation bed and then collecting the samples into one sample for at least 2 kilograms depending on the kind of plant and send to the laboratory. The sampling method depends on the size of the area, the large area should be done by scattering whereas the small area should be done in a cross line or an 'S' shape line or in a zigzag line.

A-2.2 Instructions for storage of sample and sending the sample to the laboratory

- i) Record the details of the sample such as the type of plant, the collection date and name of collector.
- ii) After collecting the sample, send it to the analysis unit within 12 hours.
- iii) When the sample can be sent the next day, store the sample in the freezing box or the refrigerator. Pack it in a plastic bag with no holes (in order to prevent the leaking of water or ice to the sample).
- iv) Fill in the form that has to accompany the sample.
- v) It is better to inform the laboratory officer a day in advance before sending the sample so that the officer has time to prepare the chemicals that are required for the analysis.

TableA-2.1 Type of plants and amount of sample needed for toxic inspection analysis

Type of product	Specific product sample	Sample size (minimum)
Small size vegetables and fruits Weight per unit <25 grams	Pea, cow-pea, cabbage, morning glory, peppermint, sweet basil, mushroom, cucumber	At least 1 kg
Medium size vegetables and fruits Weight per unit 25 to 250 grams	Eggplant, potato, onion, garlic, sweet pepper, sweet corn, bitter melon	At least 1 kg and not less than 10 units
Large size vegetables and fruits Weight per unit >250 grams	Cabbage, radish, cauliflower, Chinese cabbage, carrot, fragrant banana	At least 3 kg and not less than 5 units
Rice and other cereals	Corn, rice, nuts	At least 1 kg

A-2.3 Water sampling method from plantation for toxic residues analysis

The water sampling method from the plantation for toxic residues analysis of agricultural products should be done by collecting water from ditches draining water out of the plantation or at the mouth of canal before draining to the river.

Method of water sampling

- i) Collect the water sample in a brown glass bottle from the middle area of the waterway 15 to 50 cm below the water surface.
- ii) Dip the bottle, which is tightly closed, into water at the area to be sampled, then open the lid under water until the bottle is full and then close the lid under water.
- iii) The sample amount should be 4 litres.

Storage of water sample and delivery

1. The sample should be frozen and sent as soon as possible.
2. If it cannot be delivered immediately, store the sample bottle at 4 degrees Celsius.
3. If it cannot be frozen, it can be stored in a cool, dark place. The storage instruction should be specified in the sample sending form.
4. Fill in the form to send the sample.
5. It is better to inform the laboratory officer one day in advance before sending the sample in order that the officer has time to prepare for the chemicals required for the analysis.

A-2.4 Soil sampling from plantation for toxic residues analysis

The sampling of soil in the area not bigger than 10 rai (1.6 hectares) should be done by collecting samples from not more than ten locations. If the land is bigger than 10 rai, divide the land into plots of 10 rai each.

Instructions for soil sampling

- i) Select the location to collect the sample. Clear out grass and plant remains. Then dig a hole with shovel or drilling machine in V shape and 6-7 inches deep from the earth's surface. Throw out the first dig and shovel into the soil for 1-2 inches thick from the side of hole and collect a sample. Keep it in a container.
- ii) The soil sample should weigh not be less than 1 kilogram.

A-2.5 Sampling method for fresh vegetable for microorganism inspection

The sampling should be done by a sterile process that prevents contamination of the sample by microorganisms during the sampling process. It shall be ensured that any equipment coming in contact with the sample is sterile and free from dust, for example:

- The sample should be kept in double bags and closed tightly.
- The inspector should wear new gloves from a sealed factory package.
- All equipment should be stored in a clean and tightly closed plastic box.

Sampling instructions

- i) Clean hands or spray with 70 percent alcohol.
- ii) Wear gloves and take sample of 200 grams. Keep it in plastic bag and tie it up with the elastic band to prevent any part of vegetable extruding out of the bag.
- iii) Put the plastic bag into another plastic bag and tie it with an elastic band.
- iv) Immediately keep it in a foam box. Do not cover it with ice because it will damage the vegetable and break the bag. The sample should be sent to the laboratory immediately.
- v) In case of not sending the sample immediately after the sampling, store the sample in the refrigerator at 4-10 degrees Celsius then follow instructions above at iv).
- vi) Change gloves each time a new sample is taken.
- vii) Write detailed information completely.
- viii) It is better to inform the laboratory officer one day in advance before sending the sample in order that the officer has time to prepare for the test.

A-2.6 Method of water sampling to inspect for microorganisms

- i) Water sample should be collected from the middle area of the waterway, 15-50 cm. below the water surface and not near the shore/edge.
- ii) Dip the bottle which is tightly closed into water from the area to be sampled, then open the lid under water until the bottle is nearly full, keep a space of 2.5 cm at the top of the bottle and close the lid under the water.
- iii) Store the sample bottle at a minimum of 10 degrees Celsius. The sample should be analysed within 24 hours after the sampling.

The registration application and process

A-1 Objectives

To ensure transparency for all the concerned sectors including stages, principles, and conditions for the certification of the system on Good Manufacturing Practice (GMP) and/or the system on Hazard Analysis and Critical Control Point (HACCP) of the Department of Agriculture.

A-2 Classification

The establishments which are qualified to apply for certification may be classified as follows:

- i) Packing house
- ii) Distribution centre
- iii) Manufacturing establishment
- iv) Fumigation plant.

These four types of processing houses are qualified to apply for Good Manufacturing Practice (GMP) and/or Hazard Analysis and Critical Control Point (HACCP) certification with the Department of Agriculture.

A-3 Privileges of certified establishments

DOA certified operating establishments have the following privileges:

- i) Shall be issued with a Q certificate based on the application (details as attached). The certificate provides the details of the operator's name, the system certified and/or the name of the product being certified, and the 15 digit code, which could be use as a guarantee of credibility for the trading partner.
- ii) Operators/establishments that received food safety certification from the DOA are exempted from the inspection of each lot for the ten types of exported fruits and vegetables as specified in the regulation on pesticide residues, and 23 types of vegetables as specified in the regulation on microbiological contamination. However, they would still be under close surveillance by the DOA.
- iii) The certification of the production site and the registration by the Department of Agriculture could be indicated on the product label for export to China, Australia and Japan.
- iv) Retail stores in Thailand would prefer to purchase produce from GAP certified farms.
- v) The operator is eligible to use the Q sign to show that the operating establishments have passed all the criteria and inspection based on the production standard certified by the DOA, wherein the type and the use of sign would be as specified by the DOA.
- vi) The operators would be able to establish the database for traceability.

A-4 Penalties for non-compliance to the certification requirements of the DOA

In the event that the inspection shows non-compliance with the criteria and conditions set by the DOA, the applicant has the following penalties:

- i) In case random sampling in packing house and distribution centers is done during the period of certification, and the results show pesticide residues exceeding the standard limit, the operating establishment involved will be subjected to further random sampling, and shall be charged for the analytical services for a period of three months until such time that the result of the analysis is guaranteed safe from pesticide residues as other specified standards.
- ii) Operating establishments that are unable to maintain a production system to be within the standard criteria as certified shall be warned and/or suspended and/or certificate withdrawn.
- iii) Operators who commit violations on the misuse of the certificate of sticker as specified by the DOA shall be warned and be advised to take corrective measures.

A-5 Steps of implementing procedures

A-5.1 Operators may avail themselves of the application form (PPRDO Form no. 2) at the following:

- Technical One-Stop Service Centres of the Department of Agriculture.
- Quality and Product Standard Inspection Group (QPSIG) of the Post-harvest and Product Processing Research Development Office.
- Office of Agricultural Research and Development, Regions 1-8.

A-5.2 The QPSIG shall contact and coordinate with the operators to submit the documents as specified in the PPRDO Form no. 2.

A-5.3 Basic application requirements are to be followed by the operating establishments for certification from the DOA.

To ensure the efficient control of food safety, the operating establishments have to be designed and equipped with facilities based on the Codex Alimentarius standards and principles as follows:

- i) Location, infrastructure, and other facilities (Codex: General Principle of Food Hygiene CAC/RCP 1-1969, Rev. 4 (2003))
- ii) The production premises should be designed to prevent contamination during the production process and during other processes.
- iii) The construction materials within the building such as floors, walls should be made from durable and water resistant materials, and should not be made from materials that are possible causes of toxins contaminating the working premises.
- iv) The building walls and linings should be of smooth surface to be convenient in cleaning, and with a room height conducive to working conditions.
- v) The floors should be designed and constructed to have good drainage and ease of cleaning.
- vi) The ceilings and other hanging materials should be designed and constructed to minimize accumulation of dirt and dust, droppings, and should be well installed to prevent them dropping.
- vii) The windows should be properly designed and constructed to minimize the accumulation of dirt and dust, convenient for cleaning and if necessary should be

installed with a screen to prevent the entry of insects. The screen installed should be detachable for convenience in washing and cleaning.

- viii) The doors should be made of smooth materials and non-absorbent substances, convenient for cleaning and washing or disinfections.
- ix) The surfaces that are usually in contact with the food commodities should be in good condition, convenient for cleaning, easy maintenance, and allowing disinfections. The materials used should be durable, with smooth surface, not absorbent substance, not cause any chemical reactions with the food commodities, or with other chemical reagents such as disinfectants, and cleaning solutions.
- x) Tools and equipment
 - The general tools and equipment including containers and packages used in the production line that is in contact with food should be sufficient, designed and constructed to allow easy cleaning, disinfections, and maintenance to prevent contamination of food.
 - The general tools and equipment including containers and packages should be made from materials that do not produce toxins while being used.
 - The tools should be durable and detachable to allow easy transport, cleaning, disinfections, surveillance and facilitate inspection, such as in the case of inspecting marks made by animals or pests.
 - The tools and equipment used for high temperatures, refrigerators, storage, or freezing of food, should be designed to be able to reach the food temperature at the desired level as specified in the procedures as quickly as possible in order to ensure the safety of food.
 - The tools and equipment specified in this case should be designed to be able to be controlled and monitored, such as in some cases where there is a need to monitor the moisture, air movements and other factors that could possibly cause a threat to food safety.
- xi) Containers for waste materials and non-edible substances
 - The containers for waste materials from the production processes and other non-edible and hazardous substances should have special identification marks, and should be designed properly and be made from durable and water resistant materials.
 - The containers for toxic substances, aside from being able to be distinguished from others, should also be able to lock in order to protect food from contamination.

A-5.4 Conditions for the preparation of documents based on the GMP and/or HACCP system

- i) The operators should prepare a quality manual that covers the policies of the company and guidelines for the implementation of food safety programmes.
- ii) The operators should prepare documents on the procedures that are necessary for implementation to ensure that the personnel are able to implement the plans, or to develop the standard operating procedure (SOP) on workers hygiene, sanitation, product recalls, etc.
- iii) The operators should prepare work instructions that are necessary for the implementation of the activities to ensure that the workers are able to follow them in

the working premises, especially in areas that need special attention, such as in sterilizers, or at the chlorine solution preparation stage, etc.

- iv) The operators who are applying for GMP system certification should ensure that documents and work instructions as above are appropriately posted in the production lines, factories, and others as specified.
- v) The operators applying for HACCP system certification should prepare additional documents from the GMP system, such as the details of the products, hazard analysis, HACCP Plan, and others as specified.



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