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Training manual

Implementing ASEANGAP in the fruit and vegetable sector:

Its certification and accreditation

With the support of

ADB

Training manual

on

Implementing ASEANGAP in the fruit and vegetable sector:
Its certification and accreditation

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Foreword

Food safety has gained increasing importance over the years because of its significance both for health and for the economy. The production of safe food is essential for protecting consumers from the hazards of food-borne illnesses and is important both in the domestic food business as well as for increasing competitiveness in export markets. Hazards in food may be introduced at different stages of the food chain starting right from the primary production stage. Examples include residues above permitted levels, microbial contaminants, and heavy metals. It is important therefore to address food safety right from production at farm level.

Following Good Agriculture Practices (GAP) during on-farm production and post-production processes should result in safe agricultural products and is of immense importance for ensuring a safe food supply. GAP refers to "practices that need to be applied on farms to ensure food safety and quality during pre-production, production, harvest and post-harvest" stages. Although GAP was initially introduced in the late nineteen-nineties, it has recently gained increasing importance. ASEANGAP was developed in 2006 with the purpose of enhancing harmonization of national GAP programmes within the ASEAN region, enhancing the safety and quality of fruit and vegetables for consumers, ensuring the sustainability of natural resources, and facilitating the trade of fruit and vegetables regionally and internationally. Although many ASEAN countries have made remarkable progress in improving the safety of agricultural produce through the introduction of GAP, there are others that are still in the preliminary stages of GAP implementation.

In addition to the implementation of GAP by farmers, many importing countries as well as domestic buyers, especially the organized retailers, require that GAP implementing producers are certified. To provide certification, it is important that the certification body follows unified and correct procedures for certification so that any bias is reduced and there is increased credibility and consumer confidence. This can be achieved if the certification body is itself accredited by an independent accreditation authority or implements the principles of accreditation.

In consideration of the above, FAO has produced this training manual with the main focus on certification aspects. The training module covers the GAP requirements based on ASEANGAP as well as the implementation aspects of GAP by fruit and vegetable farmers for the purpose of enabling them to become certified as having met GAP standards. The training programme is also designed to support countries in establishing a certification scheme for GAP in line with accreditation requirements. Although the focus has been on ASEANGAP, the manual could also be used to provide guidance for any GAP scheme at global, regional or national level, whether voluntary or mandatory.

The training material has been developed and validated during two projects, namely an ADB funded project "Accelerating the Implementation of the Core Agriculture Support Program GCP/RAS/253/ASB" and a Japanese funded project "Capacity Building in Food Safety in Selected ASEAN Countries GCP/RAS/223/JPN". I take this opportunity to convey FAO's appreciation to the ADB and the Government of Japan for their funding support.

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Abbreviations and acronyms

AB	Accreditation body or board
ASEAN	Association of Southeast Asian Nations
ASEANGAP	Association of Southeast Asian Nations Good Agricultural Practices
ASEANGAP SPA	ASEANGAP Strategic Plan of Action
BRC	British Retail Consortium
CA	Corrective action or competent authority or conformity assessment
CAB	Conformity assessment body
CB	Certification body
CCFFV	Codex Committee on Fresh Fruits and Vegetables
CCFICS	Codex Committee on Food Inspection and Certification Systems
CCPFV	Codex Committee on Processed Fruits and Vegetables
EC	European Commission
EWG	Expert Working Group
FSMS	Food safety management system
GAP	Good agriculture practices
GAP-VF	GAP Vegetable Farming (Singapore)
GL	Guidelines
GMP	Good manufacturing practices
HACCP	Hazard analysis and critical control point
IAF	International Accreditation Forum
ICS	Internal control system
ID	Identity
IEC	International Electrotechnical Commission
ILAC	International Laboratory Accreditation Cooperation
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
ISO	International Organization for Standardization
IVEGRI	Indonesia Vegetable Research Institute
MFN	Most favoured nation
ML	Maximum limits
MLA	Multilateral recognition arrangement
MOU	Memorandum of understanding
MRL	Maximum residue levels
MSDS	Material safety data sheets
NA	Not applicable
NC	Non-conformity or non-compliance
NGOs	Non-governmental organizations
OIE	Organization International des Epizooties or International Organisation for Animal Health

Q GAP	Quality GAP (Thai scheme)
QM	Quality Manual
QMS	uality management system(s)
RA	Risk assessment
SALM	Malaysian Farm Accreditation Scheme
SARD	Sustainable agriculture and rural development
SOM-AMAF	Senior Officials Meeting-Ministers on Agriculture and Food
SPS	Sanitary and phytosanitary measures
TBT	Technical barriers to trade
WTO	World Trade Organization

Introduction

Food safety has gained increasing importance over the years because of its significance both for health and for the economy. The production of safe food is essential for protecting consumers from the hazards of food-borne illnesses and is important both in the domestic food business and for increasing competitiveness in export markets. Hazards may occur at different stages of the food chain starting from the primary production stage. Examples include residues above permitted levels, microbial contaminants, and heavy metals. It is important therefore to address food safety right from food production at farm level. Implementing Good Agriculture Practices (GAP) during on-farm production and post-production processes is of immense importance in ensuring a safe food supply.

GAP refers to "practices that need to be applied on farms to ensure food safety and quality during pre-production, production, harvest and post-harvest" stages. GAP was initially introduced in the late nineties as a private sector initiative by the European supermarket chains and their major suppliers and was known as EurepGAP. This name was changed to GlobalGAP in 2007.

ASEANGAP was developed in 2006 by the ASEAN Secretariat with assistance from member countries as a standard for GAP with the purpose of enhancing harmonization of national GAP programmes within the ASEAN region, enhancing the safety of fruit and vegetables for consumers, ensuring the sustainability of natural resources and facilitating the trade of fruit and vegetables regionally and internationally. For the less developed countries of the region, this was an opportunity to use ASEANGAP as a benchmark to develop their own national GAP as the ASEANGAP includes implementation guidelines and training materials as well as codes of recommended practices.

It is not only the implementation of GAP by farmers that is important; in addition, many importing countries as well as domestic buyers, especially the organized retailers, require that GAP implementing producers are certified. Certification is the procedure through which assurance is provided that those foods or systems implemented conform to the GAP requirements. In providing certification, it is important that the certification body follows unified and correct procedures for certification so that any bias is reduced and there is increased credibility and consumer confidence. This can be achieved if the certification body is accredited by an independent accreditation authority or atleast implements the principles of accreditation. Accreditation is the formal recognition of the technical and organizational competence of a conformity assessment body, in this case a certification body, to carry out a specific conformity assessment activity such as GAP certification.

In this training manual, the main focus is on certification aspects. The training will cover the GAP requirements based on ASEANGAP as well as the implementation aspects of GAP by fruit and vegetable farmers for the purpose of helping them become certified to GAP standards. The programme is also targeted at supporting countries in establishing a certification scheme for GAP in line with accreditation requirements.

The training material was developed and validated during two projects, namely an ADB funded project "Accelerating the Implementation of the Core Agriculture Support Program GCP/RAS/253/ASB" and a Japanese funded project "Capacity Building in Food Safety in Selected ASEAN Countries GCP/RAS/223/JPN". In addition, e-learning material on the subject is also being developed and will be available shortly

About the manual

The manual is a teaching tool that can be used for courses related to GAP certification or to setting up certification systems in line with accreditation requirements. It can be used by officials of the Ministry of Agriculture associated with food standards, certification and/or accreditation, by the academic community including staff of the agriculture teaching institutions, and by non-government organization representatives associated with agriculture industry/export associations or extension staff.

The manual serves as a resource for trainers preparing and conducting courses to assist both the certification bodies as well as producers that are interested in obtaining GAP certification and promoting environmental sustainability and socially acceptable practices. The training material could be used "as is" or tailored by users to the needs of each country.

Although the focus has been on ASEANGAP, the manual could also be used to provide guidance for any GAP scheme at global, regional or national level whether voluntary or mandatory. It is also important to note that any regulatory requirements need to be taken into account when developing or implementing GAP. Furthermore, the material can be modified to cover aspects relating to only food safety or also to other components, namely quality, environment protection and workers health and welfare.

Scope of the manual

The manual covers:

i) the importance of food safety and its relation to GAP;
ii) the details of ASEANGAP requirements;
iii) The certification requirements for individual producers as well as producer groups and implementation of the requirements for getting GAP certification;
iv) accreditation, its importance and requirements;
v) the basic requirements that a certification body (governmental or otherwise) will need to implement to comply with the principles of accreditation and subsequently obtain accreditation;
vi) the benefits of GAP certification and marketing aspects; and
vii) a field visit to GAP certified producers – individual and group – to see the practical implementation in terms of the documentation required to cover the procedures (including SOPs/checklists) and to see how the records are maintained.

How to use the manual

The training material is arranged in 18 modules and many of the modules have practical exercises designed to deepen participants' understanding of the module's materials. The module contains both written material as well as slides that can be used by the trainer. The slides are given in the annexes and each slide corresponds to a specific session.

It is anticipated that the time required to present the information would be about five days, including a field visit to GAP certified producers – individual and group – to see the implementation of GAP in terms of the documentation required to cover procedures (including SOPs/ checklists) and to see how records are maintained. However, the background of the course participants as well as their interest or purpose will determine how much time should be spent on each of the training modules and whether all or only part of these need to be covered. It may be also be noted that slides from page 88 to 158 are in horizontal order.

Additional resources

Additional resources include the following reference documents:

- the ASEANGAP standards and interpretative guides for the food safety, environment management, produce quality, and workers health, safety and welfare modules; and

- various ISO standards specifically ISO/IEC 17065 General requirements for bodies operating product certification systems and ISO 19011 Guidelines for auditing management systems.

Users of the manual should be alert constantly for new information and technological advances that expand their understanding of those factors associated with GAP. Awareness of these advances will allow updating the recommendations and information contained in this manual as appropriate to keep training content current.

Session 1 Introduction to the training course, resource persons and participants

Session time : 30 minutes

1.1 Purpose

The purpose of this session is to introduce the training course, the resource persons and the participants.

1.2 Objectives of the training course

The objectives of the training programme are to:

- strengthen the capacity of the horticulture sector – public and private – to adopt and promote GAP certification;
- strengthen the institutional capacity with respect to certification in line with accreditation requirements;
- provide training to trainers to support those producers who are planning to implement GAP with a view to ensuring the safe production, harvesting, handling, storage and transport of fresh fruits and vegetables with a focus on certification; and
- transfer the knowledge gained on successful practices in the countries of the region.

1.3 Learning outcomes

Participants should be able to:

- assist producers (individuals and producer groups) to implement GAP with a view to achieving certification;
- support the government in setting up GAP certification programmes in line with accreditation requirements;
- lead teams attempting to consolidate strategies for national codes of practice, guidelines and quality and safety programmes and initiatives in relation to GAP, specifically with regard to certification; and
- organize training courses on GAP, tailored to the needs of each country through this validated training programme.

1.4 About this course material

This course provides information to support the delivery of the training course. The information includes:

- notes on each session;
- PowerPoint presentations for each session; and
- references and other information sources.

Additional information will be provided during the training course.

1.5 Training programme

The programme is implemented over a period of five days as shown below. There is a significant focus on certification and accreditation requirements as well as on supporting producers to develop the GAP systems in line with certification requirements. There is also a focus on the certification body setting up systems to meet international standards on accreditation.

Day 1	
9:00 – 9:30	**Registration**
9:30 – 10:00	Opening ceremony
10:00 – 10:30	**Session 1** Introduction to training course, resource persons and participants
10:30 – 11:15	**Session 2** Background to food safety and introduction to GAP
11:15 – 11:30	**Tea/Coffee break**
11:30 – 12:15	**Session 3** Different GAP standards – GlobalGAP, ASEANGAP and various ASEAN country national GAPs
12:15 – 13:45	**Lunch break**
13:45 – 14:15	**Session 4** Relation between quality, safety and GAP
14:15 – 15:00	**Session 5** ASEANGAP – Background, purpose, scope, structure and overview
15:00 – 15:30	**Tea/Coffee break**
15:30 – 17:00	**Session 6** ASEANGAP Food safety module
Day 2	
08:30 – 09:30	**Session 7** ASEANGAP Environmental management module
09:30 – 10:00	**Tea/Coffee break**
10:00 – 11:00	**Session 8** ASEANGAP Workers health, safety and welfare module
11:00 – 12:00	**Session 9** ASEANGAP Produce quality module
12:00 – 13:30	**Lunch break**
13:30 – 14:30	**Session 10** Recap of ASEAN GAP, concept of control points in GlobalGAP & review questionnaire
14:30 – 15: 00	**Tea/Coffee break**
15:00 – 16:30	**Session 11** Certification, implementation and accreditation – An overview and introduction

Day 3	
08:30 – 10:00	**Session 12** Certification – requirements (individual and producer groups)
10:00 – 10:30	**Tea/Coffee break**
10:30 – 12:00	Certification – requirements (individual and producer groups) – continued
12:00 – 13:30	**Lunch break**
13:30 – 14:15	**Session 13** Implementation by individual producers and producer groups
14:15 – 14:30	**Tea/Coffee break**
15:00 – 16:30	Implementation by individual producers and producer groups –continued
Day 4	
08:30 – 17:00	**Session 14** Field visit to certified farms (individual and group) to understand the system in practice
Day 5	
08:30 – 09:15	**Session 14 Continued** Discussion of field visits vis-à-vis the implementation of GAP requirements
09:15 – 10:45	**Session 15** Accreditation, its importance and requirements
10:45 – 11:15	**Tea/Coffee break**
11:15 – 12:45	**Session 16** Preparing a certification body for setting up a GAP certification process and the accreditation process
12:45 – 14:15	**Lunch break**
14:15 – 15:15	**Session 17** Benefits of GAP
15:15 – 15:45	**Session 18** Evaluation and feedback
15:45 – 16:15	Closing speeches and awarding of certificates
16:15 – 16:45	**Tea/Coffee**

1.6 Training etiquette

The participants are to be requested to:

- attend the whole training – their absence for even a part of the day would make it difficult for them to follow the training since each module builds on the previous one; and
- switch their mobile phones to silent mode so as not to disturb fellow participants and tutors; they should try to avoid taking any calls while the training is being conducted.

1.7 Introduction of participants

Participants are requested to introduce themselves.

1.8 Training slides

The training slides in relation to this section are given in Annex 1.

Session 2

Background to food safety and introduction to GAP

Session time : 45 minutes

2.1 Purpose

The purpose of this session is to:

- introduce the concept of GAP in relation to food safety; and
- explain the background and importance of food safety so that participants understand the role of GAP.

2.2 How it all started – Globalization

International standards and quality have played an important role in the protection of health and safety of consumers and the facilitation of international trade. The establishment of the World Trade Organization (WTO) and the signing of non-tariff agreements, led to the dismantling of barriers to the free flow of trade and opportunities for all countries to benefit from greater access to world markets. Such global movement of food also had a negative side as it resulted in the global spread of contaminants and diseases that had entered the food chain and led to greater risks to human health (food safety); adverse economic impacts in terms of product destruction, market losses, etc.; and decreased availability of food due to some of it being contaminated. In such a scenario, food quality and safety became even more important and governments that recognized their role in protecting the health and safety of their populations started imposing stringent requirements relating to pesticide residues, contaminants, microbiological parameters, pests, disease as well as various aspects of hygiene controls. In addition, the private sector also imposed standards for their own procurements such as the British Retail Consortium (BRC) standards and GlobalGAP. To prevent indiscriminate use of standards by governments, rules and disciplines were laid down by WTO in terms of the non-tariff agreements, the Sanitary and Phytosanitary (SPS) Measures and the Technical Barriers to Trade (TBT).

2.3 The SPS and TBT Agreements

SPS and TBT Agreements came into force in 1995. The SPS Agreement emphasises the health and safety aspects whereas the TBT Agreement emphasises the quality aspects. Both Agreements generally permit member countries to impose measures to protect the health and safety of their populations, ensure the quality of the products, or preserve the integrity of their environments within certain rules so that the measures do not cause unnecessary obstacles to trade.

As mentioned above, these Agreements, although permitting countries to impose measures, standards and regulations to protect their populations and ensure fair trade, require certain rules and disciplines to be maintained so that standards, measures and regulations do not create unnecessary barriers to trade. Some of the aspects covered include that they:

- should be applied on a “most favoured nation” (MFN) basis to imports from all sources (MFN Principle);
- should not extend to imported products treatment that is less favourable than that extended to domestically produced products (National Treatment Principle);
- should not be formulated and applied in a manner to cause unnecessary obstacles to trade;

- should be based on scientific information and evidence;
- should be based on international standards, and countries should participate fully, within the limits of their resources, in the preparation of international standards; and
- should follow the Code of Good Practice for standards formulation

Furthermore, governments should:

- implement the provision of transparency whereby information is readily available and disseminated;
- apply the concept of special and differential treatment to developing countries; and
- provide technical assistance to other members specially developing country members

In the case of the SPS Agreement, some differences and additional aspects are provided for:

- where higher standards are applied, these should be based on risk assessment;
- discriminatory basis is possible in the case of differences in climate, incidence of pests and disease, etc.;
- the Agreement allows SPS measures to be adopted on a provisional basis as a precautionary step, even if scientific evidence is insufficient, subject to various conditions; and
- the Agreement allows the acceptance of SPS measures as equivalent, even if these differ from the importing country but achieve the same level of SPS protection.

The SPS Agreement further requires that countries should base their standards on international Codex standards for human health, World Organisation for Animal Health (OIE) standards for animal health and International Plant Protection Convention (IPPC) for plant health.

In the area of food, the TBT agreement applies to issues other than food safety such as nutritional claims, labelling requirements.

2.4 Codex and food safety standards

Codex, or the Codex Alimentarius Commission, was established in 1963 as a joint FAO/WHO intergovernmental body. It currently has a membership of 185 countries and the European Commission (EC), and is the single reference point for food safety related issues. Codex operates through a committee structure and has various horizontal and commodity committees. In the area of fruits and vegetables there are two commodity committees, namely the Codex Committee on Fresh Fruits and Vegetables (CCFFV) and the Codex Committee on Processed Fruits and Vegetables (CCPFV). The committees have brought out various standards, guidelines, and recommended code of practices for fresh fruits and vegetables. A Special Publication on fresh fruits and vegetables (first edition) has been published which is a compilation of 27 standards on fresh fruits and vegetables. In addition, standards, including Maximum Residue Levels (MRLs), guidelines and codes of practices for fresh fruits and vegetables have also been published. Other Codex standards that are applicable to fresh fruits and vegetables, include: the principles for traceability/ product tracing as a tool within a food inspection and certification system (CAC/GL 60 – 2006); various standards, principles and guidelines on risk analysis; the recommended international code of practice – general principles of food hygiene with an annex on HACCP systems and guidelines for its application; principles and guidelines for exchange of information in food safety emergency situations (CAC/GL 19–2004); and various standards on inspection and certification developed by the Codex Committee on Food Inspection and Certification Systems (CCFICS).

2.5 Food safety concerns

Food Safety as defined in the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969 is "an assurance that food will not cause harm to the consumer when it is prepared or eaten according to its intended use". In the case of fresh fruits and vegetables it is important that there is no harm or adverse health effects, including physical injury, as a result of consuming the foods even in their fresh state as these are often eaten raw. The adverse health effects can be caused by food safety hazards, which are explained further in session 6.

Greater awareness of food safety by consumers has led them to demand safe food. At the same time regulators have recognized their responsibility for ensuring that their citizens are provided with safe food by imposing regulations on food safety to cover both domestically produced and imported food (manufactured and produce).

With the changing world and varying influences such as increasing population, scientific advances, new technologies, changing agricultural practices, changing hazards such as more resistant hazards, and changes in lifestyles worldwide, there is a greater need to investigate and address the increasing potential of food safety incidents. Many of these incidents are seen daily in the media and press. Many have international impacts such as melamine in milk products, E. coli O104:H4 in sprouts imported into Germany, Hepatitis A in semi-dried tomatoes, various incidences of residues of pesticides and veterinary drugs, radionuclide contamination because of the Fukushima Daiichi nuclear power station disaster in Japan, etc.

Major food safety concerns in the horticulture sector include residues and contaminants; pathogens; plant and animal pests and diseases; technology issues such as irradiation treatment, genetically modified foods; physical contaminants, persistent organic pollutants such as dioxins; food allergens; and labelling and claims.

To address these concerns certain approaches have been recognized. Emphasis on the food chain approach is important as food safety hazards can arise at various stages of the food chain and need to be prevented or eliminated at each stage. The preventative risk-based approach is recommended. This aims at implementing practices that prevent the entry of hazards into the food chain as once the hazards enter the food chain, it may be difficult to remove these. It is important therefore to implement the good practices such as GAP, GMP, HACCP approach and the Food Safety Management System (FSMS). The basic good practices are the foundation of food safety across the food chain. It is also important to recognize that each and every actor in the food chain is responsible for the specific aspect or activity under his/her control, starting with the farmer who being at the first stage in the food chain has responsibility for implementing GAP, including maintaining records accurately. The processor is responsible for ensuring the production of safe food, engaging in proactive dialogue with regulatory bodies to agree on standards and ensuring efficient and effective integration of industry and official food control systems, and upgrading his facility to maintain hygiene, design the system, implement it, including maintaining documents and records. The handlers, including transporters, storage operators, agents or consolidators have responsibility for maintaining conditions necessary for ensuring safety and suitability. The government has a major role in both creating an enabling environment (scientific, technical, financial, infrastructure, regulatory) favourable to compliance by stakeholders and ensuring implementation of regulations by different actors in the areas under their control. Finally, the consumer is fully important as he needs to both demand a safe product as well as follow directions for storage, use and paying attention to the "best before" date on the product label. Therefore to achieve food safety, the role of each and every stakeholder is absolutely essential.

2.6 Introduction to GAP

GAP are practices that need to be applied on the farm to ensure food safety during pre-production, production, harvest and post-harvest stages. In many cases such practices also help to protect the environment and safety of the workers. In other words GAP is a systematic approach that aims at applying available knowledge to address environmental, economic and social sustainability dimensions for on farm production and post-production process, resulting in safe and quality food and non-food agricultural products.

At farm level, the scope covers both the farm and the pack house level. The focus at farm level relates to Section III – Primary Production, of the Recommended International Code of Practice – General Principles of Food Hygiene, and includes:

- environmental hygiene – related to the soil, water, waste disposal etc.;
- hygienic production – related to fertigation and pesticide spray schedules, irrigation schedule, planting material, storage and handling of agro- and non-agro chemicals etc.;
- handling, storage and transportation – related to practices essential to maintain food safety (quality too) during handling, storage and transportation; and
- cleaning, maintenance and personal hygiene – related to cleaning of pack house/storage premises, maintenance of fertigation and pesticide equipment and personal hygiene.

The focus at the packhouse level relates to Sections IV, V, VI VII, VIII, IX and X of the Codex Code of Practice namely:

- Design of packhouse – related to uniform flow of produce without back tracking to cross contamination;
- Control of operations – related to control of post-harvest treatment and handling;
- Maintenance and sanitation – related to maintenance and sanitation of packhouse, implements and equipment used in the packhouse etc.;
- Personal hygiene – related to personal hygiene practices to be followed by those working in the packhouse;
- Transportation – related to practices to be followed to ensure produce is safe during transportation;
- Product information – related to instructions on the label of packed produce such as “best before” date, storage conditions etc.; and
- Training – related to training of personnel working in the packhouse to be trained to follow abovepractices

A multiplicity of GAP codes, standards and regulations have been developed in recent years by the food industry and producers’ organizations and also by governments and NGOs, aiming to codify agricultural practices at farm level for a range of commodities. Their purposes vary 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. The objective of these GAP codes, standards and regulations include, to a varying degree:[1]

[1] FAO Committee on Agriculture. 2003. Development of a Framework for Good Agricultural Practices.

- ensuring safety and quality of produce in the food chain;
- capturing new market advantages by modifying supply chain governance;
- improving natural resources use, workers health and working conditions; and/
- creating new market opportunities for farmers and exporters in developing countries.

2.7 Training slides

The training slides in relation to this section are given in Annex 2.

Session 3

GAP standards – Global and ASEAN regional scenario

Session time : 45 minutes

3.1 Purpose

The purpose of this session is to:

- introduce various GAP standards at global level;
- obtain a brief understanding of GlobalGAP; and
- obtain an overview of status of various GAP standards in ASEAN region – national and international.

3.2 GlobalGAP scenario

GAP are "practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products".

These four “pillars” of GAP (economic viability, environmental sustainability, social acceptability and food safety and quality) are included in most private and public sector standards, but the scope that they actually cover varies widely.

The concept of GAP may serve as a reference tool for deciding on, at each step in the production process, the practices and/or outcomes that are environmentally sustainable and socially acceptable. The implementation of GAP should therefore contribute to Sustainable Agriculture and Rural Development (SARD) .[2]

Many of the countries are making these practices and standards mandatory. In some countries the retail chains are also individually or as a group demanding these good practices and various GAP standards for their customers’ safety and their image. These would be applicable to all their fresh produce suppliers whether domestic or international.

3.3 GlobalGAP

EurepGAP Fruits and Vegetables commenced as a proposal from European retailers in 1997 and was developed by a group representing all stages of the supply chain in the fruit and vegetable sector in Europe. It has since developed into a privately managed on-farm accreditation scheme that seeks to provide a global verification framework for fruits and vegetables based on the implementation of GAP.

As EurepGAP implementation gained wider acceptance globally, in September 2007, its name was changed to GlobalGAP to reflect its increasingly global scope. GlobalGAP is a private sector body that sets voluntary certification standards and procedures for good agricultural practices. GlobalGAP aims to increase consumers' confidence in food safety by developing good agricultural practices to 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

[2] FAO Committee on Agriculture. 2003. Development of a Framework for Good Agricultural Practices.

pre-farmgate standard, which means that the certificate covers the process of the certified product from before the seed is planted until it leaves the farm. It should be borne in mind that GlobalGAP is a purely private standard.

GlobalGAP has so far developed GAP standards for fruits and vegetables, combinable crops, flowers and ornamental plants, green coffee, tea, pigs, poultry, cattle and sheep, dairy and aquaculture (salmon). Other products are likely to be included later.[3]

The latest version of GlobalGAP is version 3 released in 2009 and in which requirements are categorized according to three levels as shown below.

Level 1 - All farm requirements (AF) – eight elements applicable to all farms.
Level 2 – further categorized into:

- Crop based (CB) – includes requirements categorized in eight elements for all the crop based primary producers.
- Livestock based (LB) – includes all primary producers based on livestock rearing.
- Aquaculture based (AB) has two sets, namely 2007 and 2009.

Level 3 – In each level 2 there are a group of level three sectors.

- In category CB there are fruits and vegetables (FV), combinable crops (CC), coffee (green) (CO), tea (TE) and flowers and ornamentals (FO).
- In category LB there are cattle and sheep (CS), dairy (DY), pigs (PG), poultry (PY) and turkey (TY).
- In set Aquaculture 2007 there is only salmonids (SN) but in set Aquaculture 2009 there are shrimps (SP), pangasius (PN) and tilapia (TA).

Currently there are more than 123 000 farms in over 111 countries implementing the GlobalGAP standard and more than 130 approved certification bodies around the world managing these certifications.

3.4 National GAP standards in the ASEAN region

ASEAN countries have made significant progress in improving safety of agricultural produce through the introduction of GAP.

In the ASEAN region, some countries have adopted National GAP standards and are also implementing certification schemes. In certain countries the government departments are operating these schemes whereas in others it is the private sector that operates the scheme or certification system. Some countries have made GAP implementation mandatory whereas others are still implementing it on a voluntary basis. The status of GAP and some relevant details about GAP in various countries are given below.

Malaysia

The *Skim Amalan Ladang Baik* or Malaysian Farm Accreditation Scheme (SALM) was developed in 2003 and provides certification to farmers that use GAP to produce safe and quality produce, prevent harm to the environment and ensure their workers' health, safety and welfare. SALM Certification requires compliance with 16 elements, which are based on the GlobalGAP standard. The practices in each element of SALM are classified as "major must" or "minor must" or "encouraged". To achieve certification, all of

[3] FAO. 2007. A Practical Manual for Producers and Exporters from Asia: Regulations, Standards and Certification for Agricultural Exports (available at www.fao.org/docrep/010/ag130e/ag130e00.htm).

the 29 “major musts”, 95 percent of the “minor musts”, and 50 percent of the “encouraged” practices must be implemented.

Singapore

GAP in Singapore is called GAP – Vegetable Farming (GAP-VF). It is a voluntary scheme and is aimed at intensive vegetable farming. The GAP-VF certification scheme was launched in 2004 and is managed by the Agri-Food and Veterinary Authority of Singapore. The scheme focuses on food safety and has six components, namely farm location, farm structure, farm environment, farm maintenance, farm practices/methods/techniques and farm management. The GAP-VF logo is promoted to consumers to provide confidence that produce grown by certified farms is traceable and safe to eat.

Indonesia

IndoGAP and its certification, SiSakti, was launched in 2004 by the government. The Indonesian Vegetable Research Institute (IVEGRI) and the Indonesian Ministry of Agriculture actively supported this development of GAP. The Indonesian GAP certification system has 16 elements, which are based on GlobalGAP and provides for a step-by-step movement towards GlobalGAP. The agricultural practices in GAP are classified as “must”, “highly recommended” or “recommended”. SiSakti is a certification system for quality and food safety assurance of agricultural products that can be applied step-by-step through three-level Prima certification: Prima III, II and I according to the achievement level on GAP. These levels are Good Pesticide Practice, Good Agricultural Practice and ASEANGAP/GlobalGAP. In this way Indonesian vegetable growers can step-by-step grow towards the ASEANGAP/GlobalGAP. The first level will be certified by private certification institutes and the next two levels by the inspection services of the Indonesian government.

Philippines

The programme for GAP for fruits and vegetables farming in the Philippines known as PhilGAP was launched in 2006. The objectives were to increase market access in both local and foreign markets, empower farmers to respond to consumer demand for food safety and quality, and facilitate adoption of sustainable practices. The programme has six components – farm location, farm structure, farm environment, farm maintenance, farm practices and farm management.

Thailand

The Q GAP Program was launched in 2003 with the purpose of ensuring that food crops produced in Thailand are safe, wholesome and meet the required standards. Q GAP has initially three levels of production processes: i) safe products, ii) safe and pest-free products, and iii) safe, pest-free and quality products. To help guide farmers, the Thai Department of Agriculture has developed 28 crop manuals that describe practices required to improve yield, quality and food safety. The manuals include varieties or planting material details, cultivation, fertilizing, irrigation, crop sanitation, crop protection, safe pesticide use, harvesting, transportation and record keeping. The Q GAP Mark is promoted to supply chain customers and to customers to provide confidence that produce grown by certified farms is safe to eat.

In 2008, the Agricultural Standards Act was promulgated to be a legal framework for establishment, certification and control of GAP standards for farm produce. Initially, the established standards were implemented voluntarily. However, mandatory standards were to be implemented in areas of food safety and public concerns. The accreditation and certification for agricultural standards are also regulated by the Agricultural Standards Act 2008 and other relevant laws. Therefore, all of the Q GAP programmes implemented before the enactment of this law were to be transited under this law.

Vietnam

The VietGAP was officially released on 28th January 2008. The Ministry of Agriculture and Rural Development decided to drive the development of a national GAP system. VietGAP is based on the ASEANGAP model and is also designed to meet the specific needs of the Vietnamese fresh fruit and vegetables industry. VietGAP consists of 12 sections, namely site assessment and selection, planting material, soil and substrates, fertilizers and soil additives, water, chemicals, harvesting and handling produce, waste management and treatment, workers and training, documents, records, traceability and recall, internal audit and complaint handling.

The national GAP standards of other ASEAN countries, namely Brunei Darussalam, Cambodia, Laos PDR, and Myanmar are at various stages of development.

ASEANGAP

The region also has the ASEANGAP, which was developed in 2006 by the ASEAN Secretariat with assistance from member countries as a standard for GAP with the purpose of enhancing harmonization of national GAP programmes within the ASEAN region, enhance the safety of fruit and vegetables for consumers, ensuring the sustainability of natural resources and facilitating the trade of fruit and vegetables regionally and internationally. The ASEANGAP is intended to enhance harmonization of product standards and facilitate trade as there are great opportunities for certified producers to enhance their export of fresh fruits and vegetables to other ASEAN countries. For the less developed countries of the region, there is an opportunity to use ASEANGAP as a benchmark to develop national GAPs as the ASEANGAP includes implementation guidelines and training materials as well as codes of recommended practices. These are good reading material to understand further and interpret the ASEANGAP.

3.5 Training slides

The training slides in relation to this section are given in Annex 3.

Session 4

Relation between quality, safety and GAP

Session time : 30 minutes

4.1 Purpose

The purpose of this session is to:

- introduce the concept of “quality” and “safety” in food (fruits and vegetables);
- differentiate between the quality and food safety parameters in fruits and vegetables; and
- understand the relation between quality, food safety and GAP.

4.2 Food quality and food safety

Quality is defined as a totality of characteristics of a product that bears on its ability to satisfy stated or implied needs. Stated needs are those that are specified by a customer or client and may include requirements such as size, shape, taste, fragrance, nutritive content and packaging. Implied needs are those that even though not specified need to be met as they impact on the safety of the product and are generally given in the regulations. Safety is therefore a part of quality but is not always understood as such by stakeholders. Safety is defined as the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use. Safety parameters include shelf-life, packaging material, pesticide residues, contaminant levels, the presence of pathogens (salmonella or E coli).

4.3 Quality and food safety parameters in fruits and vegetables

Quality parameters would include food safety and can broadly be covered under the following heads:

- Nutritive value – vitamins, proteins, fats.
- Sensory properties – taste, odour.
- Appearance – colour, size, firmness, blemishes, shape.
- Convenience – easy to peel, shelf-life.
- Food safety – pesticide residues, contaminants, pathogens.

4.4 Relationship between quality, food safety and GAP in fruits and vegetables

The food chain approach recognizes that food safety hazards can arise at various stages of the food chain and need to be prevented or eliminated at each stage. The preventative risk-based approach is recommended. This aims at implementing practices that prevent the entry of hazards into the food chain as once the hazards enter the food chain they may be difficult to remove. The fruit and vegetable chain involves some or all operations such as production, harvesting, post-harvest operations, processing, packaging, transportation, storage and retailing. GAP, GMP, HACCP approach and the Food Safety Management System (FSMS) are the foundation of ensuring food safety across the food chain and ensure that the final product is safe and of the quality desired by the customer. GAP are practices that need to be applied on farms to ensure food quality

and safety during pre-production, production, harvest and post-harvest stages. GAP influences some of the food quality as well as food safety parameters.

GAP affecting both quality and food safety are as follows:

- seed quality and selection;
- soil quality;
- crop management – spacing, weeding;
- water – quantity, quality, technique;
- fertilization – selection, concentration, use;
- diseases and pests – pesticide residue;
- post-harvest handling – maturity stage, harvesting technique;
- transport – type, packaging quality, temperature; and
- storage – condition, length.

4.5 Training slides

The training slides in relation to this section are given in Annex 4.

Session 5

ASEANGAP – An overview

Session time : 45 minutes

5.1 Purpose

The purpose of this session is to:

- introduce ASEANGAP;
- give the background and purpose of ASEANGAP;
- understand the scope of ASEANGAP; and
- understand the overall structure of the ASEANGAP and its modules.

5.2 Introduction to ASEANGAP

ASEAN is working towards forming an ASEAN Economic Community by 2015. One of the goals is to enhance intra- and extra-ASEAN trade and the long-term competitiveness of ASEAN's food and agriculture products. As part of this, ASEAN has developed ASEANGAP as a uniform standard for production of fruits and vegetables in the ASEAN region. The standard was adopted in 2006 and was launched in 2008 with the support of the ASEAN Senior Officials Meeting-Ministers on Agriculture and Food (SOM-AMAF). ASEANGAP is a **voluntary** standard for production and harvesting of fresh fruit and vegetables and for post-harvest handling on farm and in locations where produce is prepared and packed for sale.

There are ten member countries of ASEAN – Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam. The implementation of GAP programmes varies, with some countries having national GAP programmes and others at different stages of the development and implementation of GAP.

It is envisioned that with its launching, the Member States that have a national GAP in place will work towards benchmarking it against ASEANGAP. Those Member States with no national GAP will adopt the regional standard, although they have the option of adopting it on a modular basis according to their national priorities. All these activities are geared towards gaining equivalency of ASEANGAP with other international GAP so that it may be recognized by WTO as an international trading standard. With the ASEANGAP Strategic Plan of Action (SPA), the ASEAN Member States are expected to implement ASEANGAP by 2015 in response to the ASEAN move towards establishing a single market and production base.

5.3 Purpose, basis and scope of ASEANGAP

ASEANGAP is a voluntary standard for good agriculture practice for production and harvesting of fresh fruit and vegetables (produce) and for post-harvest handling on farm and in locations where produce is prepared and packed for sale.

The **purpose** of ASEANGAP is to:

- facilitate harmonization of national GAP programmes in the ASEAN region;

- facilitate trade regionally and internationally;
- enhance the safety and quality of fruit and vegetables for consumers;
- enhance the sustainability of the environment in the ASEAN region; and
- protect the health, safety and welfare of workers.

Ultimately, the adoption and implementation of ASEANGAP in the region aims to facilitate the trade of fresh fruits and vegetables among the member states and possibly beyond the region.

ASEANGAP is an assurance to the world that the fresh fruits and vegetables being produced in the region are safe for human consumption, that the produce are produced with high regard for the environment and for the protection of health, safety and welfare of workers.

Basis of ASEANGAP

The ASEANGAP drew experiences from the implementation of GAP in Malaysia, Philippines, Singapore and Thailand. This ensured that the provisions of the standard take into consideration common farming practices, infrastructure and weather patterns and the ability of farmers to adopt the provisions of the standard. Certified systems and guidelines for GAP from other countries in the world were also reviewed.

Subsequent workshops refined the standard to ensure that the recommended practices were relevant and achievable for all member countries and consistent with their country GAP programmes.

Interpretive guides for each ASEANGAP module have been developed to enhance the understanding of what is required to implement the practices. Copies of the ASEANGAP standard and interpretive guidelines are available at http://www.asean.org/resources/publications/asean-publications/9.

Scope

The ASEANGAP standard may be used for all types of production systems – conventional production systems where produce are grown in the soil, and hydroponic systems where produce are grown in inert media. Production may occur in the open or in a protected environment.

All types of fresh produce are covered by ASEANGAP except high-risk products such as sprouts and minimally processed produce such as cut fruits and vegetables. It also does not provide any basis for certification of organic products or GMO free products.

5.3 Structure and elements of each module of ASEANGAP

ASEANGAP consists of four modules covering food safety, environmental management, worker's health, safety and welfare, and produce quality. The contents of each module are introduced below.

Food safety module – The GAP for controlling food safety hazards are grouped into 10 elements and includes 84 practices. The elements include: site history and management, planting material, fertilizer and soil additives, water, agro- and non-agrochemicals, harvesting and handling produce, traceability, training, documents and records, and review of practices. Each practice in the elements is best explained in the

interpretative guidelines. The guidelines provide the user with the explanation on how contamination occurs and also provides elucidation on what is required to implement the practice.

Environmental management module – The GAP for controlling environmental hazards are grouped into 13 elements and includes 59 practices. In the interpretative guideline of the environmental management module, the potential causes for environmental harm for each element are discussed in detail and specific information is provided for each practice to explain what can be done to implement the recommended practice.

Environmental hazards are the negative impact of production, harvesting and post-harvest handling operations on the environment on and off the property. Although there are numerous common hazards directly related with farms and packing sheds, each property is different. Thus, there is need to conduct risk assessment for each property in order to manage potential environmental hazards.

Many of the elements in each of the modules are similar. Distinct elements for the environmental management module include soil and substrates, waste and energy efficiency, biodiversity and air.

Workers health, safety and welfare module – Considering that farming involves many tasks, workers are often exposed to many types of hazards. This module takes into account the role of farm workers and gives importance to their health as this has a direct effect on the loss of production and earnings of the farm. This module has 6 elements and is composed of 29 practices. The elements include chemicals (agrochemicals), harvesting and produce handling, working conditions, worker welfare, training, documents and records and review of practices.

Produce quality module – The GAP for controlling produce quality hazards are grouped into 10 elements and has 54 practices. The first element discusses the "quality plan", and the interpretative guideline provides a description on the method for developing a quality plan. For other elements, potential causes of quality loss are discussed and specific information is provided for each practice to explain what is required to implement the practice. The elements include planting material, fertilizer and soil additives, water, agro- and non-agrochemicals, harvesting and handling produce, traceability and recall, training, documents and records, and review of practices.

Each module can be used alone or in combination with other modules. This enables stage-wise or progressive implementation of ASEANGAP, based on country priorities.

The following table shows how the four modules integrate into one overall standard.

Contents	**Modules**			
	Food safety	**Environmental management**	**Worker health, safety and welfare**	**Produce quality**
Quality plan				√
Site history and management	√	√		
Planting material	√	√		√
Soil and substrates		√		
Fertilizers and soil additives	√	√		√
Water	√	√		√
Chemicals	√	√	√	√
Harvesting and handling produce	√	√	√	√
Waste and energy efficiency		√		
Biodiversity		√		
Air		√		
Working conditions			√	
Worker welfare			√	
Traceability and recall	√			√
Training	√	√	√	√
Documents and records	√	√	√	√
Reviewing practices	√	√	√	√

Alignment of countries with ASEANGAP

At the second meeting of the Expert Working Group (EWG) ASEANGAP, the AMS agreed that priority should be given to the alignment of the food safety module. As of the third meeting of EWG ASEANGAP, six Member States had closely aligned their food safety module with that of the ASEANGAP as indicated in the table below. With respect to the other three modules, most ASEAN Member States are still working towards alignment with ASEANGAP.

Country	Food safety	Environmental Management	Worker's health and safety	Produce quality
Thailand	C	P	P	C
Malaysia	C	P	P	S
Indonesia	C	C	P	P
Singapore	C	N	N	S
Philippines	C	N	P	S
Brunei Darussalam	C	N	N	N

T = Total alignment C = close alignment P = partial alignment

N = no alignment S = covered by another national standard

5.4 Training slides

The training slides in relation to this section are given in Annex 5.

Session 6

ASEANGAP – Food safety module

Session time : 90 minutes

6.1 Purpose

The purpose of this session is to:

- understand the requirements of the food safety module of the ASEANGAP;
- understand the hazards and risk assessment related to various elements of the food safety module and how to assess the same; and
- understand various good agricultural practices (GAP) that help minimize hazards.

6.2 Documents needed

For the purpose of this section, it is important to have the following documents:

- Interpretative Guide for ASEANGAP Food Safety Module.
- Recommended International Code of Practice: Codex General Principles of Food Hygiene (CAC/RCP 1 – 1969).
- Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53 – 2003).

6.3 Food safety hazards

A **food safety hazard** is any chemical, biological, or physical agent or condition/property in the fruits and vegetables that can become an unacceptable health risk to consumers when consuming the fruits and vegetables as intended.

Controlling food safety hazards in the preparation of site and planting material and during production, harvesting and post-harvest handling (trimming, grading, packing, transport etc.) of fresh produce is important to protect consumer health and to gain access to markets in the ASEAN region and globally. The importance is growing as food safety – the "farm to fork approach" – is gaining regulatory support.

There are three categories of food safety hazards:

1 Chemical
2 Biological
3 Physical.

Fresh fruits and vegetables can be contaminated through **direct** contact of produce with the hazards or **indirectly** through the produce coming into contact with contaminated soil, water, people, equipment, materials, fertilizers and soil additives, packing material, transportation vehicles and so on.

Chemical hazards

Chemical hazards in fresh fruits and vegetables may be added during production, harvesting and post-harvest handling of fresh produce or may occur naturally. Types of chemical hazards include:

- agrochemical residues (pesticides, herbicides, fungicides, etc.) in produce that exceed maximum residue limits (MRL);
- non-agrochemical contamination – for example, fuels, lubricants (oil and grease) and sanitizers;
- heavy metals in excess of maximum levels (ML);
- naturally occurring plant toxins; and
- allergenic agents - allergens.

Biological hazards

Biological hazards associated with fruits and vegetables include:

- bacteria such as *Salmonella, Escherichia coli, Shigella, Listeria monocytogenes*;
- parasites such as Cysts of *Giardia, Cryptospodium, Cyclospore*;
- viruses such as *Hepatitis A, Rota virus, Norwalk or Norwalk-like virus*; and
- fungi such as *penicillium, fusarium, rhizopus*.

Sources of biological contamination can result from poor personal hygiene practices, contact with soil or farm animal faeces, untreated animal and human wastes, contaminated water used for handling produce.

Most of the biological hazards are micro-organisms or microbes such as bacteria, fungi, and algae that can only be seen through a microscope (bacteria) or through an electronic microscope (virus). These are found everywhere in the environment. Fruit and vegetables typically contain a diverse mixture of a large number of micro-organisms.

Some of these micro-organisms cause spoilage by producing undesirable quality characteristics such as rotting and bad odour and flavour. These do not generally affect the health of consumers but are important for the quality parameters of the product.

Pathogenic micro-organisms are those that affect consumer health and cause illness either by the micro-organism itself growing inside the human (infection) or by toxins produced by the micro-organism (intoxication).

Pathogenic micro-organisms are mostly found on the outside of fresh fruit and vegetables, but some can enter the plant tissue. The common types of pathogenic micro-organisms associated with fresh fruits and vegetables are:

- *Salmonella* species
- *Escherichia coli* (*E. coli*)
- *Shigella* species
- *Listeria monocytogenes*.

Physical hazards

Physical hazards are foreign objects that can cause illness or injury to consumers. Contamination can occur during production, harvesting and post-harvest handling.

The foreign objects can come from:

- the environment – soil, stones, sticks, weed seeds;
- equipment, containers, buildings and structures – glass, wood, metal pieces, plastic, paint flakes, cement pieces, other sharp objects;
- human handling of produce – jewellery, hair clips, pens and other personal items; and
- packaging material – packaging plastics, cardboard, paper, foil.

6.4 Module elements

The good agricultural practices for controlling food safety hazards are grouped into ten elements. Guidance on the good agricultural practices for each element is contained in the "Interpretive Guide for ASEANGAP Food Safety Module".

1) **Site history and management**

   Site history is assessed to identify the risk of contamination to crops grown from the previous use of chemical and other biological hazards on the site or on adjoining sites. Where significant risks are identified, the site should not be used for fresh produce production or without first taking some action to manage the risk. If remedial action is required to manage any risk, a monitoring programme should be in place to make sure that contamination to the produce does not occur. Contaminated sites should not be used for fresh produce production.

2) **Planting material**

   If planting material is produced from a farm, a record is to be kept of any fertilizers or chemicals used and the reason for usage. If planting material is obtained from another farm or nursery, the name of the farm and date of supply should be recorded. No varieties known to be toxic to humans should be grown.

3) **Fertilizers and soil additives**

   Assessment of the chemical and biological risks related to fertilizers and soil additives used for each crop grown must be carried out and records of any significant hazards identified should be maintained. If any significant hazards are identified, measures should be taken to minimize the risk of contamination to produce. Fertilizers and soil additives should be selected so as to minimize the risk of heavy metal contamination to produce. Untreated organic materials are not to be applied where significant risk is identified. If organic materials are treated on farm, the method of application, date and duration of treatment are to be recorded. If organic material is obtained from outside the farm and there is a significant risk identified, documents should be available from the supplier to show that the material has been treated to minimize the risk of contamination to produce. Human sewage is not to be used for fresh produce production. The facilities for storage, mixing and loading of fertilizer and soil additives and for composting of organic material are to be

located and constructed and maintained to minimize the risk of contamination to production sites and water sources. Records shall be maintained for fertilizers and soil additives detailing the source, product name, date and quantity obtained and also for the application detailing the date, name of product, rate and method of application and name of the operators.

4) Water

Assessment of the source of water used for irrigation, application of chemicals or handling, washing, treating the produce or cleaning and sanitation is to be done to minimize the risks of chemical and biological contamination. Where water testing is required to assess the risk of contamination, tests are to be conducted at a frequency appropriate to the conditions impacting on the water supply and records are to be maintained. Where a significant risk is identified, either a safe alternative water source is to be used or the water should be treated before use. Sewage water should not be used during production or for post-harvest handling. Where treated water is permitted, the water quality must comply with the national regulations.

5) Chemicals

Chemicals used on the farm can be categorized into **agrochemicals** that are applied on the farm or produce such as fertilizers, pesticides and additives, and **non-agrochemicals** such as grease, fuels and oils that are required for other purposes.

Persons using chemicals should:

- purchase chemicals only from registered/licensed suppliers;
- avoid mixing of two or more chemicals, unless recommended by a competent authority;
- apply the right dosage and avoid any surplus of the chemicals used;
- dispose of surplus chemicals in a manner to avoid contamination to the produce;
- ensure the withholding periods from chemical application to harvest are met (these depend on the kinds of the chemicals applied, e.g. bio-pesticides may be 3 to 5 days, chlor-organic pesticides may be 7 to 10 days and phosphorous pesticides may be 14 to 16 days);
- ensure equipment for applying chemicals is maintained in working condition and checked for effective operation by a technically competent person;
- wash properly after using equipment and dispose of washing water in a manner to avoid contamination to produce;
- store chemicals in a well lit and secure structure, which is located and constructed to minimize the risk of contaminating produce and equipped with notices and emergency facilities in the event of a chemical spill;
- not store liquid chemicals on shelves above powders;
- store chemicals in the original container with a legible label and according to label directions and instructions from the competent authority;
- if chemicals are transferred to another container, clearly mark the container with the name of the chemicals, the dosage to be used and the withholding period;
- not re-use a chemical container – it should be collected in a secure place and properly disposed of according to the country's regulations and in a manner to avoid contamination of produce and the environment;
- dispose of obsolete or expired chemicals through official collection channels or in legal off-site areas;

- ensure chemicals are applied correctly by testing produce (in an accredited laboratory) for chemical residues at a predetermined frequency in line with the competent authority requirement of the country where produce is traded;
- keep a record of chemicals obtained, detailing the chemicals used, name of the supplier, date and quantity obtained, date of manufacture and expiry, application reason, treatment location, dosage, method, date of application and name of applicant;
- where applicable, keep a record of chemicals held in storage, detailing chemical name, date and quantities procured and date of complete use or disposal;
- if chemical residues in excess of MRL are detected, whether in the market where the product is traded or exported, the marketing of the product should cease and the cause of contamination should be investigated. Corrective actions should be taken to prevent re-occurrence and a record kept of the incident and the actions taken;
- handle, store and dispose of non-agrochemicals such as fuels, oils, and other non-agro-chemicals in a manner to avoid any risks to food safety.

6) Harvesting and handling produce

Harvested produce should not be placed directly on the soil, or on the floor of the handling, packing or storage areas.

- **Equipment, containers and materials**: Equipment, containers and materials that come in contact with produce should not contaminate produce and should be made of material that is easy to clean. The containers used for storage of chemicals, waste, and other dangerous substances should not be used to hold or store produce. Equipment and containers should be maintained regularly to minimize the contamination of produce and should be kept in areas separate from chemicals, fertilizers and soil additives to avoid cross contamination. Equipment, containers and material should be checked for soundness and cleanliness before use.

- **Building and structures**: the building and structures used for growing, parking, handling and storage of produce should be constructed and maintained to minimize the risk of contaminating produce. Grease, oil, fuel, and farm machinery should be segregated from handling, packing and storage areas to prevent contamination of produce. Sewage, waste disposal and drainage system should be constructed so as to minimize the risk of contaminating the production site and the water supply. Lights in the packinghouse or store should be shatter proof or protected with a shatter proof cover. Where equipment and tools that may be sources of physical hazards are located in the same building as handling, packing and storage areas, these should be isolated by a physical barrier or not used during the handling and packing of produce.

- **Cleaning and sanitation**: Equipment, tools, containers and materials that may be sources of contamination to produce should be regularly cleaned and sanitized. Appropriate cleaning and sanitation chemicals are to be selected to minimize the risk of these chemicals contaminating produce.

- **Animal and pest control**: House and farm animals are to be kept out of the production site (especially where crops are grown in or close to the ground) and around handling, packing and storage areas. Measures to prevent the presence of pests in and around handling, packing and

storage areas are to be applied. Baits and traps used for pest control should be located and maintained to minimize the risk of contaminating produce.

- **Personal hygiene**: Workers need to be trained in personal hygiene practices and training records kept. Written instructions on personal hygiene should be provided to workers and displayed in prominent locations. Toilets and hand washing facilities should be available to workers and maintained in a hygienic condition.

- **Produce treatment**: the quality of the water applied to the edible parts of produce should be equivalent to that of drinking water and the same norms should apply. Chemicals applied for post-harvest and waxes should follow the instructions and recommendations from competent authorities.

- **Storage and transport**: Produce should be stored and transported separately from goods that are potential sources of chemical, biological or physical contamination. Produce should be stored in cool places and overloading should be avoided. Produce should be covered to reduce moisture loss during transportation. Containers filled with produce should not be placed in direct contact with soil, where there is a significant risk of contaminating produce from soil. Vehicles used for transporting produce should be kept clean and maintained in good condition.

7) Traceability and recall

Production sites should be identified by a name or code and recorded on a property map. Packed containers should be clearly marked with name and identification to enable traceability of the produce to the farm or site where produce is grown. A record detailing the date of delivery and destination of each produce consignment should be maintained. Where produce is identified as contaminated or potentially contaminated, it should be isolated, but if such identification is made after the produce is sold the buyers or consumers should be notified immediately. The cause of contamination should be investigated and corrective action taken to prevent its recurrence and a record kept of the incident and the action taken.

8) Training

The farmers and workers need sufficient training in the areas of responsibility relevant to good agricultural practices and records of training should be kept. Some of the aspects that need to be included in any training are:

- the proper purchase, handling, storage and use of chemicals, including selection of chemicals or bio-pesticides, which are approved and recommended by the competent authorities for the crops grown;
- the application of proper Integrated Pest Management and avoidance of use of inorganic chemicals;
- information and updates on the MRLs of the countries where the produce is to be traded;
- checking that chemicals are used correctly and before shelf life/expiry date; and
- the need to test produce for chemical residues at a frequency required by customers or the market.

9) Documents and records

Records of all practices are to be kept for a minimum period of two years or longer, if required by country legislation or customer; out-of-date documents should be discarded and only current versions should be used.

10) Review of practices

All practices should be reviewed at least once a year to ensure they are done correctly and actions should be taken to correct any deficiency identified and to resolve complaints related to food safety and a record should be kept of the complaint and the actions taken.

6.5 Practical exercise

1 Form into three or four groups of three persons.

2 Distribute sections among groups.

3 List food safety hazards possible in each section and identify the good agricultural practices that can help control and minimize them.

4 Present to the other groups and open for discussion.

What are the possible hazards to affect food safety	Good agricultural practices
Name of element selected:	

6.6 Training slides

The training slides in relation to this section are given in Annex 6.

Session 7

ASEANGAP – Environmental management module

Session time : 60 minutes

7.1 Purpose

The purpose of this session is to:

- understand the requirements of the environmental management module of the ASEANGAP;
- understand the hazards and risk assessment related to various elements of the environmental management module; and
- understand various good agricultural practices (GAP) that help control these hazards.

7.2 Environmental hazards and steps for controlling these

Environmental hazards are adverse impacts that occur to the environment on and off the property as a result of the production, harvesting and post-harvest handling of fruit and vegetables. Although there are many common hazards associated with farms and packing sheds, every property is different. The particular circumstances of each property need to be considered when managing potential environmental hazards.

The list below contains potential environmental hazards[4] grouped into seven categories:

- **land and soil** – soil erosion, poor soil structure, salinity, soil acidity and alkalinity, sodicity (high sodium levels);
- **water –** depletion of water resources, poor water quality;
- **chemicals –** contamination of environment from inappropriate storage, application and disposal of chemicals, spray drift;
- **nutrients –** degradation of soil and water;
- **waste –** degradation of soil, water and air, depletion of natural resources;
- **air –** dust, smoke, greenhouse gases, noise, odour; and
- **energy** – depletion of natural resources.

The steps to controlling environmental hazards are as follows:

i) Identify the hazards – What can happen to the environment on and off the property if something goes wrong?

ii) Assess the risk – What is the likelihood and consequence of the environmental hazard occurring?

iii) Control the hazard – What good agricultural practices are required to prevent or minimize the risk of significant hazards?

iv) Monitor and review hazards –Are the good agricultural practices working and have there been any changes that introduce new hazards?

[4] ASEAN Secretariat. 2007. Interpretative guide for ASEANGAP. Good agricultural practices for production of fresh fruits and vegetables in ASEAN countries. Environmental Management Module.

7.3 Module elements

The good agricultural practices for controlling environmental hazards are grouped into 13 elements. Guidance on the good agricultural practices for each element is contained in the "Interpretive Guide for ASEANGAP Environmental Management Module".

1) Site history and management

Sites used for production should comply with the country regulations that restrict production at high altitudes or steep slopes. A risk assessment should be conducted and take into consideration prior use of the site, the potential impact of crop production and post-harvest handling on and off the site, and potential impact of adjacent sites on the new site. If there is a significant risk to the environment identified, the new site should either not be used for crop production and post-harvest handling or measures to prevent or minimize these potential hazards should be taken. Highly degraded areas should be managed to avoid further degradation and management of the site activity should conform to the country environmental conditions covering air, water, noise, soil, biodiversity and other environmental issues. A farm layout map is maintained showing the crop production sites, environmentally sensitive or degraded areas, if any, storage and mixing areas of chemicals, water storage, watercourse and drains, building structures and roads.

2) Planting material

Diseases or pest-resistant planting material is selected to minimize the use of chemicals. The planting material is also selected for compatibility with soil type, soil fertility and so that the use of additional nutrient supplying chemicals is avoided.

3) Soil and substrates

The production practices should be suitable for the soil type and not increase the risk of environmental degradation. Where possible soil maps should be used to plan for crop rotation, or a fallow period to increase soil fertility should be encouraged. Production practices to improve and maintain soil structure as well as soil compaction should be used to avoid erosion. Chemicals used to sterilize soils and substrates may be used and a record should be kept detailing the site name, name of the product or material, name of the chemicals, the date of application, dosage and method of application and operator's name.

4) Fertilizers and soil additives

Fertilizers and soil additives are applied according to the recommendation of competent authorities and depending on crop and soil type to avoid the nutrient run-off or leaching. Facilities for storage, mixing or loading of fertilizer and soil additives and for composting of organic matter should be located, constructed and maintained to minimize the risk of environmental pollution on and off the site and of water sources. The equipment used to apply fertilizers and soil additives should be maintained in good condition and annually checked by a technically competent person. The application of fertilizers and soil additive should be recorded detailing the name of the fertilizer or soil additive, location, date, rate and method of application and the operator's name.

5) Water

Irrigation should be based on crop water requirements, availability of water and soil moisture levels. The irrigation system should be checked and maintained in good condition to ensure its efficiency

during irrigation and to minimize wastage of water. Water collection, storage and use should be managed in accordance with country regulations and a record should be kept of irrigation use, detailing crop, date, location and volume of water irrigated or duration of irrigation. To minimize the risk to the environment, any water discharge or wastewater should be treated.

6) Chemicals

Farmers or workers need to be trained to a level appropriate to their area of responsibility for chemical application. Chemicals used for crop protection should be selected so as to minimize the negative effect on the environment and antagonist organisms of pests and diseases. Crop protection measures should be based on the recommendations of competent authorities or a plant protection organization. The use of chemicals should be minimized by the application of Integrated Pest Management (IPM) and biological control products. Only chemicals obtained from licensed suppliers and approved by a competent authority for the crop grown should be used. Chemicals are applied according to the label directions and guidance from the competent authority. A rotation strategy for chemical application and crop protection measures should be used to avoid pests and diseases resistance. Appropriate volumes of chemicals are mixed to minimize the amount of surplus chemical after application. Surplus chemical mixes and tank washings should be disposed of in a manner that minimizes the risk of environmental harm on and off the site. Empty chemical containers should be collected and disposed of according to country regulations. Obsolete chemicals that are unusable or no longer approved should be identified clearly, kept in secure places and disposed of through official collection systems. The application of chemicals should be recorded for each crop, detailing the chemicals' names, the reason for application, date of application, location, dosage and method of application and name of operator and, where applicable, a record of chemicals held in storage should be kept detailing the chemicals' names, date and quantity of purchase and date when completely used or disposed of.

7) Harvesting and handling produce

Chemicals used for post-harvesting and handling produce should be stored and disposed of according to country regulations so as to minimize the risk to environment.

8) Waste and energy efficiency

A waste management procedure should be documented and followed, including identification of waste products generated during production, harvesting and handling produce, using practices to minimize waste generation, to reuse, recycle waste and dispose of waste. The use of electricity and fuel should be reviewed to ensure that efficient operation practices are implemented. Machine and equipment should be maintained in good condition to ensure the efficiency of operation and to save energy.

9) Biodiversity

The production plan should comply with country regulations covering protected plant and animal species and to preserve native plant and animal species, including native vegetation areas, wildlife corridors and vegetation areas on or near the bank of waterways. Measures should be applied to control feral animals and environmental pests.

10) Air

If an offensive odour, or smoke, dust or noise are generated from production practices, management action should be taken to minimize the impact on neighbouring property and surrounding areas.

11) Training

Farmers and workers should be trained to have appropriate knowledge in their areas of responsibility related to good agricultural practices and training records should be kept.

12) Documents and records

Records of good agricultural practices should be kept for two years or more depending on the country regulations or customer requirements. Out-of-date documents should be discarded and only the current versions of documents relevant to good agriculture practices should be in use.

13) Review of practices

All practices should be reviewed at least once a year to ensure that the practices are carried out correctly. This review identifies the practices that are not being done correctly and actions should be instituted to investigate and rectify the problem. A record should be kept to show that all practices have been reviewed and the corrective actions taken clearly documented.

7.4 Practical exercise

1 Keep the groups already formed.

2 Distribute sections among groups.

3 List environmental hazards possible for each element, elaborate the impacts, and identify the good agricultural practices that can help control and minimize them.

4 Present it to the other groups and open for discussion.

Identify the environmental hazards and the impacts of these on the environment (on and off the property)	Good agricultural practices to control/ minimize the hazards
Name of element selected	

7.5 Training slides

The training slides in relation to this section are given in Annex 7.

Session 8

ASEANGAP – Worker health, safety and welfare module

Session time : 60 minutes

8.1 Purpose

The purpose of this session is to:

- understand the requirements of the worker health, safety and welfare module of the ASEANGAP;
- understand the issues related to worker health, safety and welfare; and
- understand various good agricultural practices (GAP) that help minimize these issues

8.2 Hazards to worker's health, safety and welfare and steps for controlling these

Every year, thousands of farmers or workers are injured and/or fall ill and some die in farming accidents. There are several types of hazards that affect those who work and live in the farm. Injury and illness are a large cost to the health and well being of farmers and workers. Therefore, they must take reasonable care of their own health and safety.

Accidents are preventable and there are many things a farmer can do to protect workers from injury and illness by being aware of hazards to health, safety and welfare. Although there are many common hazards on fresh produce farms and packing sheds, every farm and packing shed is different. Therefore, particular circumstances and the environment of the farm or packing shed need to be considered when managing hazards.

The following table lists the common hazards that occur during the production, harvesting, handling, packing, storing and transporting of fresh produce. The most common cause of injury and illness is associated with the use of machinery, equipment and vehicles.

Types of hazards	**Causes of hazards (examples only)**
Mechanical	Exposed moving parts of machinery, equipment and vehicles, working at heights, heavy manual lifting
Chemical	Inappropriate storage, handling and application of pesticides, handling of hazardous substances
Biological	Contamination of water, equipment, containers, materials, produce and worker facilities with micro-organisms that cause human illness, infectious diseases from animals and pests (e.g. leptospirosis)
Electrical	Low overhead power lines, faulty equipment and electrical leads and sockets
Solar radiation	Excessive exposure to sun and heat
Noise	Loud machinery, equipment and vehicles

Stress and fatigue	Long working hours, continuous work without rest periods
Welfare	Exploitation of age, gender and race

The steps to managing the risks of hazards to worker's health, safety and welfare are as follows:

1. Identify the hazards – What can happen to worker's health, safety and welfare if something goes wrong?
2. Assess the risk – What is the likelihood and consequence of the hazard occurring?
3. Control the hazard – What good agricultural practices are required to prevent or minimize the risk of injury and illness?
4. Monitor and review hazards – Are the good agricultural practices working and have there been any changes that introduce new hazards?

8.3 Module elements

The good agricultural practices for controlling hazards to worker health, safety and welfare are grouped into six elements. Guidance on the good agricultural practices for each element is contained in the "Interpretive Guide for ASEANGAP Worker's Health, Safety and Welfare Module".

1) Chemicals

Chemical should be handled and applied by trained workers with appropriate knowledge and skills. Chemicals should be stored in a well lit, sound and secure structure with access permitted to authorized persons only. The storage structure should be such as to minimize the risk of contaminating workers and it should be equipped with emergency facilities in case of a chemical spill. Chemicals should be stored in their original containers with legible labels and instructions from competent authorities. If chemicals are transferred to another container the new container should be clearly marked with the brand name, dosage of use, and withholding period. Where there is a significant risk of chemical contamination of workers, material safety data sheets (MSDS) should be available. Safety instructions should be provided to workers and displayed in appropriate and readily accessible places. A facility and first aid measures should be available to treat workers contaminated with chemicals and accident and emergency instructions are to be documented and placed in prominent places within the chemical storage area. The workers that are handling and applying chemicals or entering newly sprayed sites should be equipped with suitable protective clothing and equipment. Clothes and protective equipment should be cleaned and stored separately from crop protection chemicals. People should not be allowed access to the sites where chemical are being applied or have just been applied for the appropriate period depending on the type of chemical used and if chemicals have been applied in public areas of public access, the site should be marked with warning signs.

2) Working conditions

Working conditions should be suitable for workers but where hazardous conditions cannot be avoided entirely, protective equipment/ clothing should be provided. All farm vehicles, equipment and tools, including electrical and mechanical devices should be adequately guarded and maintained in good condition to minimize the risk to workers. A safety operation manual and handling practices should be provided to workers and displayed in prominent places.

Personal hygiene: Farmers and workers should be trained in personal hygiene practices and records of training kept. Written instructions on personal hygiene practices should be provided to workers and displayed in prominent locations. Toilets and hand washing facilities should be readily available and maintained in a hygienic condition. Sewage is to be disposed of in a manner to minimize the risk of contamination to workers. Where employers are to provide health cover to workers, any serious health issue is to be reported to the appropriate authorities. Measures should be applied to minimize the access of domestic and farm animals to production sites and around the handling, packing and storage areas.

3) Worker welfare

This is important both for the wellbeing of workers and the productivity of the farm or the processing shed. Workers should not be exploited because of gender, age, race or other reasons. Where possible, living quarters should be suitable for human habitation and contain basic services and facilities; the minimum working age should comply with country regulations and workers should be older than 15 years of age.

4) Training

Workers should be informed about the risks associated with health and safety when working at sites. Workers should be trained and have appropriate knowledge in areas of their responsibility such as vehicles, tools and equipment operation, accident and emergency response, safe use of chemicals and personal hygiene.

5) Documents and records

Records of good agricultural practices are to be kept for two years or more in accordance with government regulations. Out-of-date documents should be discarded and only current versions should be in use.

6) Review of practices

All practices are to be reviewed at least once a year to ensure that they are done correctly and actions should be taken to correct any deficiencies identified. A record of the same should be kept to show that all practices have been reviewed and any corrective actions taken are documented. Actions should be taken to resolve complaints related to worker health, safety and welfare, and records kept on complaints and action taken.

8.4 Practical exercise

1 Keep the groups already formed.

2 Distribute types of hazards to groups as below:

Group A – Mechanical and chemical

Group B – Biological and electrical

Group C – Solar radiation and noise

Group D – Stress, fatigue and welfare.

3 List worker health, safety and welfare issues/ hazards possible in each element/section, identify their impacts on the worker and identify the good agricultural practices that can help control and minimize them.

4 Present to the other groups and open for discussion.

Identify the hazards that can affect worker's health, safety and welfare and impact of each hazard on workers	Good agricultural practices to control or minimize the hazards
Name of element selected	

8.5 Training slides

The training slides in relation to this section are given in Annex 8.

Session 9

ASEANGAP – Produce quality module

Session time : 60 minutes

9.1 Purpose

The purpose of this session is to:

- understand the requirements of the produce quality module of the ASEANGAP;
- understand the issues related to produce quality; and
- understand various good agricultural practices (GAP) that help minimize these issues.

9.2 Quality issues, produce quality hazards and quality losses

A quality hazard is any characteristic that prevents the produce from meeting the requirements of a customer or a government regulation. For example the produce quality may not meet the requirement of a customer for size, colour, maturity, external appearance, flavour, or shelf-life. The produce may also not meet the quarantine regulations of an importing country because of the presence of a pest or disease or it may be incorrectly labelled. There are some basic quality characteristics that customers expect when purchasing fresh produce. These are some of the expectations:

- free of major injury, spoilage or blemish;
- not overripe, excessively soft or wilted;
- free of dirt, unacceptable chemical residues and other foreign matter;
- free of foreign odour or taste; and
- free of quarantine pests.

There are three types of quality characteristics – external appearance, internal quality, and hidden quality.

External appearance includes those characteristics that can be seen by the eye, e.g. external colour, size, shape, disease, insects, blemishes, and packaging.

Internal quality includes those characteristics that can't be seen from the outside and the produce needs to be cut or eaten to identify the quality, e.g. internal colour, firmness, texture, flavour, aroma, disease and insects.

Hidden quality includes those characteristics that can't be seen, smelt or tasted, e.g. shelf-life, nutritional value and genetic modification.

Quality loss during production

The inherent quality of produce is determined by the production practices. Once produce has been harvested, produce quality cannot be improved. Production practices affect all types of quality characteristics.

External characteristics such as colour, size, and shape are affected by practices that impact on plant growth and crop load such as water and nutrition management, pruning and thinning. External appearance can be reduced by disease infection, pest damage and mechanical injuries such as wind rub.

The internal appearance, eating quality, shelf-life and nutritional value of produce is reduced by water stress, inadequate plant nutrition and excessive crop loads. GAP during production is aimed at increasing the inherent quality of produce at the time of harvest.

Quality loss at harvest

The maturity of produce not only affects its quality at harvest but also its shelf-life. Maturity refers to a stage of development in the growth of the fruit or vegetable. Maturation continues until the start of senescence (aging), leading to the death of the produce.

Deciding when produce is mature and ready for harvest can be difficult. For some crops, maturity indices have been developed to assist in the decision process. For other crops, harvesting at the correct time can be highly subjective.

The optimum maturity for harvest is when the plant has completed sufficient growth and development to ensure that produce quality and shelf life are acceptable to the consumer. Most produce start to senesce once harvested, eventually leading to death. If produce is harvested too mature, senescence may occur before the produce reaches the consumer. If produce is harvested when immature, quality characteristics such as colour, size, shape, flavour and texture will be reduced.

Quality loss during post-harvest handling

There are many causes of quality loss after harvest. Quality loss can be a result of the normal biological processes, which can be slowed but not stopped, and can be the result of poor handling practices.

Major causes of quality loss after harvest are:

- Acceleration of senescence
- Water loss
- Mechanical injuries
- Physiological disorders
- Disease infection
- Growth and development.

9.3 Module elements

The good agricultural practices for controlling produce quality hazards are grouped into ten elements. Guidance on the good agricultural practices for each element is contained in the “Interpretive Guide for ASEANGAP Produce Quality Module”.

1) Quality plan

Identified practices to manage produce quality during the production, harvesting and post-harvesting stages.

2) Planting material

Select vegetables and fruits to satisfy market requirement and obtain these from farms or nurseries recognized by the Plant Health Office to ensure the good quality and freedom from diseases.

3) Fertilizers and soil additives

These must be based on the crop grown and recommendations from the competent authority. These should be properly applied to ensure their effectiveness. The facilities used for composting should be constructed and maintained so as to prevent cross contamination of the crop. Records of application of fertilizers or soil additives should be maintained giving details of amount and date of application and the name of person who applied the fertilizers and additives as well as the provider.

4) Water

Irrigation is based on water requirements of the crop grown, water availability and soil moisture levels. Records detailing the date of irrigation, location, duration and volume of water applied should be kept.

5) Chemicals

Farmers or workers should be trained to a level appropriate to their responsibility for chemical application. Where possible, Integrated Pest Management systems should be applied. Chemicals should be obtained from licensed suppliers and applied according to label directions or permit issued by a competent authority for the crop grown. A chemical rotation strategy and other crop protection measures to be practiced to avoid pest resistance to chemicals. Equipment used to apply chemicals should be maintained in good conditions and should be working properly. Records should be maintained, giving the name of chemical, reason for application, date and dosage of application, method of application, weather condition and the name of person who applied the chemicals.

6) Harvesting and handling produce

These include the following aspects:

- **Harvesting:** A maturity index is used to determine the appropriate time to harvest produce. Harvesting should be carried out at the coolest time of the day, namely early in the morning. The equipment used should be suitable for harvesting and clean before using. The container should be suitable for harvesting produce and not overfilled. Liners should be used to cover the rough surfaces. Containers should be covered to reduce moisture loss. Produce should leave the field as early as possible and placed in the shade. The containers should not be stacked on top of each other unless these are designed to avoid produce damage when stacked.
- **Handling and packaging produce:** clean water should be used for handling, washing and treatment of produce and the water should be changed regularly to avoid spoilage organisms damaging the produce. Equipment, containers and materials that may contact produce are to be regularly cleaned. Excessive drops and impacts should be avoided to minimize mechanical damage to produce. Produce should not be placed directly on the soil or floor surfaces. Packing

and storing should be under roofs and in cool places and produce should be graded and packed according to the customer or market requirements.

- **Storage and transport:** If there is to be a long wait for transport, produce should be held at the lowest temperature possible. Produce should be covered during transportation and maintained at appropriate temperature to avoid quality loss. Checking for cleanliness and removing all sources of contamination should be done. Avoid mixing incompatible produce during transport. Produce is to be quickly transported to its destination.

7) Traceability and recall

Produce from different sites should be identified by name or code, and the same should be placed on the containers and recorded on a property map and on all documents. A record is to be kept of the date of supply, quantity of produce and destination of each consignment.

8) Training

Farmers and workers are trained in the area of their responsibility relevant to GAP and a record of training is kept.

9) Documents and records

All records of GAP should be kept for at least two years or longer depending on the countries' legal requirements and out-of-date documents should be discarded.

10) Review of practices

All practices should be reviewed once a year to ensure that they are done correctly and action should be taken to correct any deficiencies identified. A record should be kept to show that all practices have been reviewed and any corrective actions taken documented. Action should be taken to resolve complaints related to produce quality and a record should be kept of the action taken related to the complaint.

9.4 Practical exercise

1 Keep the groups already formed.

2 Distribute types of hazards to groups as below:

Group A – During production

Group B – During harvest

Group C – Post-harvest 1 (Aging and water loss)

Group D – Post-harvest 2 (mechanical injury and growth and development).

3 List produce quality hazards possible for each element/section and identify the good agricultural practices that can help control and minimize these.

4 Present to the other groups and open for discussion.

Identify the hazards that can affect product quality and the impact of the hazard on produce quality	Good agricultural practices to control or minimize hazard
Name of element selected	

9.5 Training slides

The training slides in relation to this section are given in Annex 9.

Session 10

Recap of ASEANGAP, concepts of control points in GlobalGAP and review questionnaire

Session time : 60 minutes

10.1 Purpose

The purpose of this session is to:

- recap the scope, structure and requirements of ASEANGAP; and
- understand the concepts of control points in GlobalGAP – especially to understand the certification concept.

10.2 ASEANGAP requirements recap

Many forces are driving the global demand for assurance that fruits and vegetables are safe to eat and of the right quality, and are produced and handled during the pre-production, production, harvesting and post-harvest stages in a manner that does not cause harm to the environment and the health, safety and welfare of workers. The impact of these driving forces is that retailer requirements for farmers to comply with GAP is increasing and governments are strengthening legal requirements for food safety, environmental protection, and worker health, safety and welfare.

The implementation of GAP programmes currently within the ASEAN region varies, with some countries having government certified systems and others beginning the journey with awareness programmes for farmers. Under a project funded by the ASEAN Australia Development Cooperation Program, a standard for ASEANGAP has been developed to harmonise GAP programmes in the region. The goal is to facilitate trade within ASEAN and between ASEAN countries and global markets, improve opportunities for farmers, and help sustain a safe food supply and the environment.

ASEANGAP is an umbrella standard that individual member countries may benchmark their national programmes against to gain equivalence. The scope of ASEANGAP covers the production, harvesting and post-harvest handling of fresh fruit and vegetables on farm and post-harvest handling in locations where produce is packed for sale. ASEANGAP consists of four modules covering food safety, environmental management, worker health, safety and welfare, and produce quality. Each module can be used alone or in combination with other modules. This enables progressive implementation of ASEANGAP, module by module based on individual country priorities.

There are various agricultural practices which can help control one or more issues. A summary of the module as given in the ASEANGAP is presented below:

Contents	Modules			
	Food safety	Environmental management	Worker health, safety, welfare	Produce quality
Quality plan				√
Site history and management	√	√		
Planting material	√	√		√
Soil and substrates		√		
Fertilizers and soil additives	√	√		√
Water	√	√		√
Chemicals	√	√	√	√
Harvesting and handling produce	√	√	√	√
Waste and energy efficiency		√		
Biodiversity		√		
Air		√		
Working conditions			√	
Worker welfare			√	
Traceability and recall	√			√
Training	√	√	√	√
Documents and records	√	√	√	√
Reviewing practices	√	√	√	√

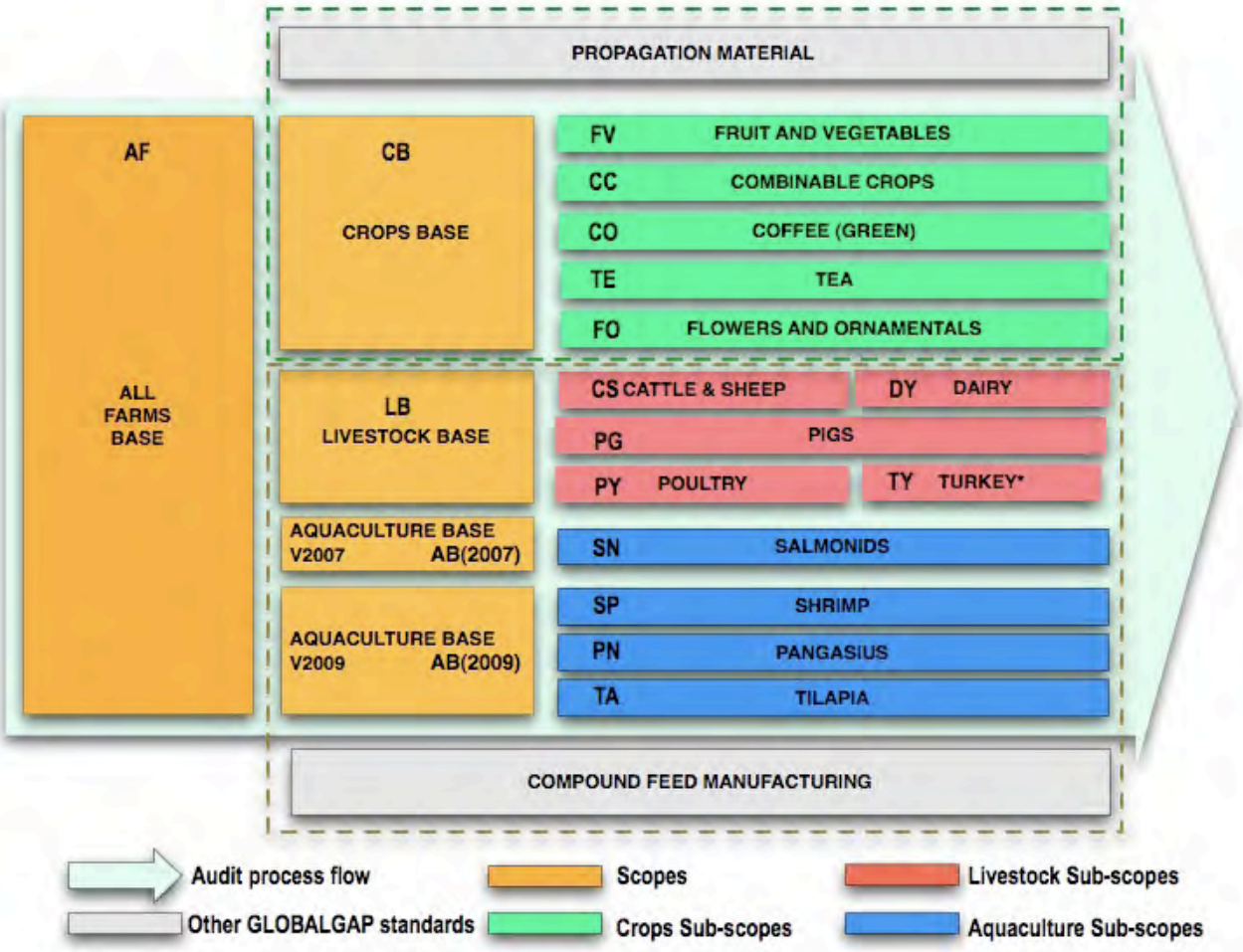
10.3 GlobalGAP V3 2009 structure and concepts of control points in GlobalGAP

As mentioned earlier, GlobalGAP formed as a result of the collaboration of European buyers who hoped to increase public confidence in the safety of the food they sold through a fair and equitably administered, voluntary programme of GAP. Originally named EurepGAP, it focused first on pesticide residue levels in produce and animal welfare in livestock, but quickly expanded its focus to include microbial food safety. Over

time the buyer collaboration evolved into a true partnership among buyers, producers, and NGOs across the globe.

The programme was renamed GlobalGAP in 2007 in recognition of its global reach and scope. GlobalGAP has expanded its scope to addresses social responsibility issues focusing specifically on worker health and safety. GlobalGAP recognized the importance of collaboration among smallholders and the opportunity afforded by such collaboration to raise the standards of operations. They therefore placed major emphasis on developing a "group certification approach", which they call "Option 2" in addition to having the conventional "individual producer certification" called "Option 1".

The latest version of GlobalGAP – GlobalGAP Version 3 2009 – has the following structure



Under this structure the requirements are categorized as follows:

- General regulations set out the rules by which the standard will be administered.
- Control Points and Compliance Criteria (CPCC) is the standard with which the producer must comply, and which gives specific details on each of the requirements.
- A checklist forms the basis of the producer external audit and the producer and producer groups must use the checklist to fulfil the annual internal assessment requirements.

The general regulations are divided into “major musts”, “minor musts” and “recommendations”. All control points must be audited externally, as well as included in self-assessments (Option 1) and internal group inspections (Option 2). The possible answers are: compliance (yes), non- compliance (no) or not applicable (N/A). Where the answer is “not applicable”, a justification must be presented. The N/A verdict cannot be given to those control points where the compliance criteria specify "No N/A". Evidence must be given for all “major must” control points and 95 percent of the “minor must” control points.

The GlobalGAP Control Points and Compliance Criteria document is separated into different modules, each one covering different areas or levels of activity on a production site. These sections are grouped into:

- “Scopes” covering more generic production issues, classified more broadly (all farm base, crops base, livestock base and aquaculture base).
- “Subscopes” covering specific production details, classified per product type (fruit and vegetables, combinable crops, coffee (green), tea, flowers and ornamentals, cattle and sheep, pigs, dairy, poultry, salmon and trout and any subscopes that might be added during the validity period of this document)

Summary of cause-wise GlobalGAP Control Points Compliance Criteria

Module	Major	Minor	Recommended	Total
All farm based	12	22	11	45
Crop based	28	75	17	120
Fruits and vegetables	34	28	09	71
Combinable crops	24	21	04	49
Total	98	146	41	285

10.4 Types of certification in GlobalGAP

There are four types of certificate in the GlobalGAP certification scheme which are:

- GlobalGAP standard
  - Option 1 – Individual producer
  - Option 2 – Group certification

- Benchmarked standard
  - Option 3 – Individual producer certification
  - Option 4 – Group certification.

These are explained in detail in further sessions.

10.5 Training slides

The training slides in relation to this section are given in Annex 10.

10.6 Recap questionnaire

SECTION 1 STATE TRUE OR FALSE (NOT PARTIALLY CORRECT OR FALSE)

Q1 If a significant risk of chemical or biological contamination of produce has been identified, the site should not be used for production of fresh produce, no matter what.

TRUE/FALSE

Q2 If planting material is produced on the farm, then only records of planting material need to be maintained.

TRUE/FALSE

Q3 Use of approved chemicals has no risk of contaminating both the soil and produce.

TRUE/FALSE

Q4 Untreated organic material does not pose any significant risk to contaminate the produce with biological or chemical hazards.

TRUE/FALSE

Q5 Equipment, containers and materials should be checked for soundness and cleanliness before use by supervisors.

TRUE/FALSE

Q6 Even if the farm is doing well and there are no customer complaints, there is a need to review the practices at least once a year.

TRUE/FALSE

Q7 All environmental hazards like food safety hazards also affect the health of the consumer of the produce, which makes these essential for food safety as well.

TRUE/FALSE

Q8 Good agricultural practices can significantly minimize the environmental hazards.

TRUE/FALSE

Q9 Storage areas for fertilizers should be protected from direct sunlight and rain; well-ventilated with fresh air to keep fertilizer dry; designed to minimize pest infestation, mould growth and damage; and designed to keep any spillage to one place and be easy to clean up.

TRUE/FALSE

Q10 Water could lead to food safety hazards such as contamination as well as environmental hazards.

TRUE/FALSE

Q11 It is acceptable to use a slightly higher concentration of pesticides than those recommended so as to be doubly sure that the pests are destroyed.

TRUE/FALSE

Q12 Workers health, safety and welfare are the responsibility of the farm owners.

TRUE/FALSE

Q13 It is the workers choice whether or not she/he wishes to wear protective garments provided by the farm owner.

TRUE/FALSE

Q14 Pest and domestic animals can cause illness to the workers of the farm.

TRUE/FALSE

Q15 Different fruits and vegetables require different refrigeration temperatures to maintain quality.

TRUE/FALSE

Q16 Chilling of fruits and vegetables can also lead to safety hazards by causing injury.

TRUE/FALSE

Q17 Bacteria causing plant disease generally do not affect food safety.

TRUE/FALSE

Q18 Produce quality module is the first module that the ASEAN countries should focus on for implementation since they are visible parameters and quality is what determines the sale of fresh fruits and vegetables.

TRUE/FALSE

Q19 Water can also lead to quality hazards in fruits and vegetables.

TRUE/FALSE

Q20 GAP takes care of four types of hazards, namely those that affect food safety, those that affect the environment, those that harm the health, safety and welfare of the people working in the farm and those that affect the quality parameters of the produce.

TRUE/FALSE

SECTION 2 ANSWER THE FOLLOWING QUESTIONS BRIEFLY

Q1 List three physical hazards that lead to adverse health effects on consumers.

a. _____

b. _____

c. _____

Q2 List three good agricultural practices that will help minimize food safety hazard – pesticide residues.

a. _____

_____

b. _____

_____

c. _____

_____

Q3 List three elements that are repeated in all four modules of ASEANGAP.

a. _____

b. _____

c. _____

Q4 List three agricultural practices that will control the food safety physical hazards.

a. _____

_____

b. _____

_____

c. _____

_____

Q5 List three mechanical hazards that could lead to worker health and safety issues.

a. _____

b. _____

c. _____

Session 11

Certification, implementation and accreditation – An overview and introduction

Session time : 90 minutes

11.1 Purpose

The purpose of this session is to:

- create an understanding of the concepts of certification and accreditation;
- get an overview of how to implement GAP leading to certification;
- understand the relation between certification, implementation of certification criteria by producers and the concept of accreditation; and
- be in a position to assist countries to work out certification modalities.

11.2 Certification

Certification has been defined differently by both ISO and Codex.

Certification (ISO definition):[5] Third-party attestation related to products, processes, systems or persons.

"Attestation" has been defined as the issuance of a statement based on a decision following review that fulfilment of specified requirements has been demonstrated. "Review" is verification of the suitability, adequacy, effectiveness of selection and determination activities, and the result of these activities, with regard to fulfilment of specified requirements by an object of conformity assessment.

Certification (Codex definition) is the procedure by which official or officially recognized certification bodies provide written or equivalent assurance that food or food control systems conform to requirements. Certification of food may be, as appropriate, based on a range of inspection activities, which may include continuous online inspection, auditing of quality assurance systems, and examination of finished products (Codex).

11.3 An overview of GAP certification

GAP certification is the verification of practices on the farm that minimize contamination during the production process of farm produce. It covers verification of compliance with all sections of GAP requirements (ASEANGAP or National GAP). It certifies with respect to requirements for food safety, environment management, safety of farm workers and produce quality.

GAP certification may be either a regulatory requirement or a buyer requirement and may be carried out by a government body, e.g. Department of Agriculture in Malaysia carries out the SALM certification and

[5] ISO/IEC17000 Conformity assessment -Vocabulary and general principles

Department of Agriculture in Thailand carries out the QGAP certification, or it could be a private standard certified by private certification bodies such as JGAP in Japan or ThaiGAP in Thailand.

Benefits of GAP certification

GAP certification has many benefits, some common ones are as follows:

- it ensures both the quality and safety of produce throughout the primary production process: pre-production, production, harvest and post-harvest stages;
- since GAP is becoming not only a buyer's requirement but also a regulatory requirement, getting GAP certification would help to gain market access;
- as certification would take care of both quality and food safety, it would help to protect supermarkets' own brands;
- GAP certification is a process certification system so in the case of contamination, due to the traceability requirements, it will help track where the contamination came from, the source and where it went and deal with it appropriately; and
- since the certified system would also look at the environmental management and social welfare aspects of production this would be an added advantage.

A certification scheme is essentially a programme that provides assurance through a certification mechanism that certain laid down standards have been met. In the case of GAP, the certification scheme would provide assurance against the provisions pertaining to GAP certification or criteria for recognition of GAP certification. Criteria to be implemented by producers to obtain certification would include GAP standards requirements and certification body requirements.

A **certification body** (CB) is an independent entity that is contracted by the producer or producer group to evaluate the compliance of their good agricultural practices to the requirements of ASEANGAP or National GAP and certification requirements and to issue a certificate. The CB can be a private or governmental body. It, however, also needs to comply to a set of requirements so that its certification has credibility.

For selection of a certification body by the producer, there would be many aspects to consider such as:

- Certification scope – the produce that the farmer or farmer group require to get certified should be within the scope of the certification body.
- Reputation of CB/ acceptability – getting certified by a reputable certification body would be preferred by the farmer or farmer group since the customer would have more confidence on the certificate and the certificate would be more acceptable in the market. One way of ensuring it is to choose a certification body which is accredited by an accreditation body which in turn is signatory to the IAF MLA for ISO ISO 17065; or if the AB is signatory to IAF-GlobalGAP MoU which would mean it is competent for GAP.
- Accreditation – an accredited certification body would provide greater confidence as also international acceptability of certificate.
- Target market of products – it would be better to select a certification body that is better known in the target market of products and country.
- Audit approach and positive approach – certification needs to be done with a positive approach where the aim is to improve the farmer's compliance to GAP and not to find non-compliances only for the sake of it.

- Competence and experience of auditors in the scope – the CB auditors should have experience for the scope of produce that the farmer is applying for.
- Cost of certification – cost-effectiveness is also an important criterion for selecting a certification body.
- Impartiality, confidentiality, competence – the certification body needs to be impartial and maintain confidentiality as well as have competency in the scope of certification. This is ensured by accreditation.

11.4 Accreditation

Accreditation is an independent evaluation of conformity assessment bodies against recognized standards to ensure their impartiality and competence. Through the application of national and international standards, governments, buyers and consumers can have confidence in the calibration and test results, inspection reports and product/ process/ service/ management systems certifications provided by the laboratories, inspection bodies and certification bodies, collectively called the conformity assessment bodies (CABs).

Organizations that certify industry or producers against standards such as GAP are called Certification bodies (CBs) and these are themselves formally accredited by accreditation bodies; such certification bodies are known as "accredited certification bodies". The accreditation process ensures that their certification practices are acceptable based on international standards, meaning that they are competent to certify industry or producers, behave ethically and themselves implement suitable quality management system.

Accreditation bodies are established in many countries with the primary purpose of ensuring that conformity assessment bodies are subject to oversight by an authoritative body. Accreditation bodies that have been evaluated by peers as competent, sign mutual recognition arrangements that enhance the acceptance of products and services across national borders, thereby creating a framework to support international trade through the removal of technical barriers. The International Accreditation Forum (IAF) manages these arrangements for certification bodies and International Laboratory Accreditation Cooperation (ILAC) manages these for inspection bodies and laboratories.

The **International Accreditation Forum** (IAF) is the world association of accreditation bodies for certifications and other bodies interested in conformity assessment in the fields of management systems, products, services, personnel and other similar programmes of conformity assessment. Its primary function is to develop a single worldwide programme of certification, which reduces risk for business and its customers by assuring them that accredited certificates may be relied upon. Accreditation assures users of the competence and impartiality of the body accredited.

Details of IAF are available at www.iaf.nu.

11.5 Implementation

To obtain certification with respect to a GAP certification scheme, the farmer would need to implement the requirements of GAP. This process of implementing the requirements for certification is referred to as implementation. For GAP certification the farms need to implement the following:

- the requirements of ASEANGAP/NationalGAP; and
- the requirements of the certification body for the specific option that the farmer wishes to apply for.

Implementation is done in a stepwise manner. The steps of implementation are:

- make a decision to implement, including for which option (individual or producer group);
- awareness training on requirements of ASEANAGAP/ National GAP to all concerned in the production activity;
- develop documentation including procedures/ SOPs/ instructions and records;
- review practices to close gaps;
- apply for certification; and
- develop internal control procedures if group certification is required.

11.6 Interrelation between implementation, certification and accreditation

A producer or producer group would apply to the certification body to get certified. Certification would require them to implement not only the GAP requirements but also the requirements of the certification body or the Scheme, if there is a separate scheme for GAP certification, such as the “internal control system” for the producer group.

Certification is granted by a certification body that in turn needs to have a system in place to grant certification to the applying producers/producer groups. This system, in addition to the certification system, would need to have many support systems to run a smooth and efficient certification body.

If the certification body system complies with the requirements of accreditation, then the certification body is said to be “accredited”. An accredited certification body will have more credibility in the market. Accreditation is a recognized means of oversight over certification bodies today and is being increasingly relied upon by governments for international as well as domestic trade.

The terms "accreditation" and "certification" are sometimes used interchangeably, however, they are not synonymous. The hierarchy is explained in the slides. A producer is certified against certain international or national standard requirements such as ASEANGAP. The term accreditation is not used for the producer. Only a certification body performing conformity assessment can be accredited and only if it does the assessment in a proper, competent and impartial manner as per the accreditation requirements.

As per ISO/IEC 17000:2004, Certification is "third party attestation related to products, processes, systems or persons" whereas accreditation is “third party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks”.

11.7 Training slides

The training slides in relation to this section are given in Annex 11.

Session 12

Certification – Requirements (individual and producer groups)

Session time : 180 minutes

12.1 Purpose

The purpose of this session is to:

- create awareness and understanding of the requirements of GAP certification for CB and producers; and
- increase the capacity of national government/focal points in countries to develop certification requirements for GAP.

12.2 Certification process – general requirements for individuals and producer groups

GAP certification is often required to qualify as a supplier to leading retailers and importing countries. The process of achieving certification can often be technically intensive, time consuming and expensive for smaller businesses. Those who cannot afford it therefore have limited opportunities to increase their market share.

There are two options for GAP certification – individual certification and producer group certification.

Certification is carried out against certain criteria. Criteria are defined as the requirements against which an audit is conducted to verify compliance before issuing the certificate to the producer/producer group.

GAP certification criteria would include essentially two types of compliance:

1 Compliance with the GAP standards or requirements – ASEANGAP or the National GAP – against which the producer or producer group wishes to get certified. Compliance with regulatory requirements would be covered under the GAP requirements. Additional requirements could be the buyer's requirements or the importing country requirements.

2 Compliance with requirements of the certification body (or specified in the schemeif there is a scheme of which CB is part) for the specific option selected by individual or producer group.

Additionally, under specific conditions, the criteria for GAP certification may include analysis of samples of produce.

The certification body or scheme requirements include some general requirements applicable to both individual producers and producer groups as well as additional requirements for the producer group that generally cover system requirements that ensure that the internal control system of the producer group is working adequately. For either of the options, i.e. individual producers or producer group, the certification process includes the following steps:

- **Activities to be completed prior to application for certification** – Prior to application, the producer or producer group needs to implement practices as per GAP requirements for at least three months and then conduct a self-assessment. Once they are confident that the requirements are implemented and they are ready for certification they should apply.

- **Rights and obligations of producers** - Each producer, individual or group would have rights and obligations that need to be communicated to them. These include:

  "Rights"

  - right to obtain services from the CB in a timely manner;
  - right to appeal against the CB's decision;
  - right to apply for both individual and group certification but not for the same produce;
  - right to cancel application with the CB or request temporary suspension; and
  - right to change a CB provided corrective actions are taken and reply of cancellation received from the previous CB.

  "**Obligations"**

  - to accept auditing plan and requirements of the certification body (CB);
  - can apply for both individual and group certification but obligation that it is not for the same produce;
  - responsible for compliance with GAP certification requirements as well as CB provisions; and
  - to notify the CB of changes to the production status e.g. name of produce, quantity of produce, inclusion or withdrawal of group member producer for producer group certification, etc.

- **Application for certification –** Producer shall provide required information for certification that is generally given in the application format and is to be filled in by the applicant. This includes both general information and production information.
  - **General information** – name, address and contact details, proof of legal entity or certified ID, details of land held and whether under ownership/ lease, details of manpower.
  - **Production information** – type of produce, production site, annual production area, whether greenhouse or field production, single harvest/multiple harvest, since when area under cultivation.

- **Review of application** – Application is reviewed by a designated person of the CB for adequacy and completeness and before registering the applicant for certification. The CB should also review and ensure they have the competency for certifying as per the scope requested.

- **Assessment by CB** - Once the producer is registered (application is accepted), the CB proceeds as follows:
  - Pre-assessment (optional). The purpose of the pre-assessment is to see if the producer is ready for initial evaluation or assessment. It would include a review of documentation and verification of implementation of some of the GAP requirements – a sample audit.
  - Evaluation or assessment. It is a planned external assessment conducted by the certification body and would lead to certification.
    - The CB fixes a date for the assessment and designates an appropriate auditor who is capable and has no conflict of interests, e.g. the auditor should not have worked for the producer for a

certain number of years (to be set by the certification body in their procedures) before auditing him/her.

- Producer is notified in advance when the assessment will be conducted.
- Assessment is conducted on-site, preferably during harvest time. If farmers have more than one crop in the scope, then preferably during at least harvest time of one crop.

- **Grant of certification** – Certification is granted on the basis of compliance with certification criteria and may include: test samples meeting requirements; GAP requirements met; certification scheme requirements met; and satisfactory resolution of non-conformities. There is no conditional grant of certification.

  The term of certification is two to three years as decided by the CB or the scheme and is valid from the date of decision by the CB.

  The certification document is called a "certificate" and it would need to specify:

  General information

  - Name and address of producer or producer group including geographical location.
  - Unique identification number, which would also help identification and traceability of producer and producer group.
  - Name of CB and its accreditation boards.

  Term of certification (to be developed by the certification body)

  - Certification is effective from date of decision by CB.
  - Validity may be two to three years.

  Scope of certification

  - Type of produce.
  - Location of production site including all areas registered for production including buildings and planting area.
  - Declaration of ownership.
  - Assessment covers all activities of production of produce to be sold out of farm/plot and right till it reaches the customer (covers only primary production and not processed product.

- **Issue of Certification mark** – A certification mark is issued by the certification body or the scheme owner to the producer or producer group to use once they are certified but with certain terms and conditions. A producer, importer, or exporter of produce from a GAP certified farm can use the certification mark or logo along with the registration number given by the CB on the publicity materials, websites, brochures, etc but not on the produce or its package. Each scheme has rules for use of certification mark/ logo which should be carefully studied. Use of the mark as per terms and conditions is to be verified by producers themselves, the internal control system for producer groups and also by the CB during subsequent audits/surveillance audits.

- **Surveillance** - Once certified, the producers need at least an annual surveillance audit to verify that the producer is still implementing the GAP requirements as before (Initial assessment/evaluation).

  Surveillance is generally conducted once a year. During surveillance, the following is checked and verified:

- status of compliance with the requirements of the certification criteria
  - GAP requirements including requirements stated in the four modules of food safety; environmental; worker health, safety and welfare and produce quality module;
  - certification body requirements including internal audit; handling and disposal of non-conforming products; actions taken on non-conformities, handling of customer complaints; redress of complaints, if any; use of certification mark;
- information on production of produce and the names of consignees to whom certified produce supplied; and
- generally at least 1 produce to be in field/storage during surveillance audit.

- **Verification without notification** – GAP certification may require unannounced verifications or verification without notification to be conducted by the CB. The sample number of producers verified and extent of verification is given in the scheme (some schemes give 10 percent) both for certified individual producers and producer groups. For individual producers all requirements of scope of certification need to be verified and for producer groups only internal control system of the group need to be verified. A producer or producer group may fall within the 10 percent annually and therefore needs to be prepared for such unannounced audits or verification without notification.

- **Renewal of certification** – Once the stipulated validity of the certificate has expired (date is given on the certificate), the producer would need to get a re-assessment or re-evaluation done to renew the certificate.

  The CB may notify the producer in advance about expiry of the certificate. Based on the same the producer or producer group submits an application three months prior to expiry of certification for extension of certification.

  The performance is reviewed based on a re-assessment as well as performance during the surveillance audits. The re-assessment procedures are the same as initial assessment and include a full evaluation on GAP requirements and CB requirements. The performance during the surveillance audits would include the surveillance evaluation reports, handling and disposition of non-conforming products, any suspension of certificate during the previous validity period, corrective actions taken, complaints received, and any other adverse information.

- **Non compliances (NC), corrective actions (CA) and sanctions** – If any gaps are found during the assessment, these are called non-compliances. These can be in relation to GAP requirements or CB requirements and need to be acted upon by the producer (corrective actions). Corrective actions need to be taken up in the specified period of time, otherwise various sanctions including warning, suspension and withdrawal are likely to be imposed.

  Corrective actions play a major role in improving the GAP system as these ensure that the non-compliances do not recur.

  CB can impose sanctions on producers if corrective actions are not taken as indicated. Sanctions may be given in three sequential levels of actions:

  - Warning – producer not correcting non-compliance on GAP requirements within prescribed period.
  - Suspension – if producer does not take corrective action as indicated by CB.
  - Withdrawal –

- ✓ producer cannot correct non-compliance partly or wholly within prescribed period and corrections are not completed within six months, or
- ✓ non-compliance found on production process and proved that production quality cannot be ensured and is certain to affect confidence in the product.

Decisions on sanctions are taken by a committee authorized to take decisions on certification and not by the auditors.

Note: Producer cannot change CB unless non-compliance is corrected, i.e. corrective action is taken on the identified non-compliance.

- **Appeals and complaints** - In the event of the producer not agreeing with any assessment decision or sanction, there is a provision for appeal. There is also a provision for making complaints to CB by any stakeholder.

This completes the certification process requirements for both the individual and producer group.

12.3 Certification requirements – for producer group

A producer group may be defined as a group of two or more producers with a legal status or a natural group. In the case where the applicant is a producer group, they would need to be under the same management and internal control system (ICS). This would lead to additional certification requirements for the producer group applicants. These would include:

- **Structure and management** – The structure and status of the group would need to be documented and demonstrated. This would include member contracts, producer registration, defined management and organizational structure.

  Documents for registration with CB should clearly demonstrate:
  - that the group of producers applying for certification has legal status or is a natural group with no legal status;
  - that the group of producers is responsible for production, management, and the ownership of the produce; and
  - the administrative/management structure of the producer group, clearly indicating the relationship among members of the producer group.

  Member contracts – There should be a written and signed contract between each member of the group and the producer group to cover individual details (name and tax payer ID of producer, address); farm details (details of each plot of production, type of crop); obligations (to abide by the requirements of GAP and to abide by the procedures of the group, its policy including technical guidelines of the group); sanctions that might be imposed in case of non-compliance with GAP/any other internal requirements.

  Producer registration – Each member shall be registered with the group. The register of the producer group shall define the status of each member under GAP certification and provide details for each producer member, including name, contact person, address, contact numbers (phone, fax, e-mail), ID

number (e.g. citizen ID, tax payer ID), registered produce, registered planting/production area and/or quantity of registered produce, CB lists (if producer applies to more than one CB), date of internal audit, status of certification (during application) to include GAP certified, warning, suspension, revocation, etc.

Management and organization - The management structure should include the internal control system coordination (who is the coordinator and his/her role and responsibility), internal auditors (list of internal auditors and their competencies, roles and responsibilities), group committee on certification (a committee that will make decisions based on internal audit findings – sanctions and infringements) and functions and responsibilities of each staff involving GAP certification. The same should be documented.

- **Training** – This is a very important factor and the producer group shall:
  - ensure all staff assigned to operate on GAP certification are well trained and competent and capable of functioning according to requirements;
  - determine knowledge and competency, required training and qualification of designated staff, which shall be well written in line with GAP requirements;
  - keep a record on qualifications and training of designated staff;
  - ensure that internal auditors are trained and evaluated to ensure compliance with audit procedures and interpretation of GAP requirements of internal and surveillance auditor; and
  - ensure that the system of updating information and awareness on developments, dissemination and legislative revision (latest version) in relation to GAP compliance is in place.

- **Quality Manual** – The group would need to develop a Quality Manual that would include the scope of certification, the management and internal control, policy and working procedures and policy for member registration and designated members.

  The Quality Manual content should be regularly verified and updated to ensure compliance with GAP/ other requirements of the producer group.

  Scope of GAP being implemented for certification or other regulations in force should be included in the Quality Manual. In the case of improvements or changes, the producer group should revise the manual accordingly and timely as stipulated by the CB.

- **Document control** – All documents related to implementation of management and internal control system for group GAP compliance should be controlled. These include:
  - Quality Manual (QM): outlines the entire system of the group and how it is managed.
  - Working Procedures on GAP (may be included in QM): specific procedures followed by the group members.
  - Recommendations on operation (may be included in QM): specific instructions on the tasks to be followed at each farm.
  - Record formats to be used for system.
  - External origin documents that include documents such as the applicable GAP standard.

  The requirements for control of documents include availability of control procedures for documents along with a list of all procedures; documents to be verified and approved by authorized person prior to publication; change control procedures (in relation to documents modified) to be in place; all controlled

documents to have a document number, approved date, volume number and page number; and obsolete procedures to be removed and replaced by current latest versions.

- **Record control** – Producer group shall maintain records to demonstrate the effective control of management and internal control systems and GAP requirements. All records maintained need to be controlled (i.e. should be legible, original, filed properly and retrievable) and maintained for a minimum of two years unless specified by regulations or customer. Information may be kept online or electronically, but should be accessible during audit by the CB.

- **Complaint management** – A system to manage customer complaints effectively is to be implemented that provides for efficient response. Procedures for complaint management to be documented and cover complaint receiving, complaint registering, problem identification, causative analysis, solution and follow up. Records relating to complaints shall be maintained.

- **Internal audits** – Internal audit is self-assessment of adequacy of compliance to GAP requirements, management and internal control system of each member including audit on farm/plot of each member in compliance with GAP requirements. Audits need to be conducted at least once in a year. Records of internal audit plan, the audit result, follow up on corrective action based on internal audit are to be maintained.

  Some features of the internal audit procedure include:
  - internal auditor to be designated to audit each farm/plot;
  - review process on the results of internal audit and producer status shall be included in the internal audit report;
  - new members of group given first priority for internal audit and audited first; and
  - original copy of internal audit report should be maintained and be complete.

  Every internal audit needs to have a report that will be reviewed and verified (audited) by the external auditor (certification body auditor). The internal audit report should necessarily have the following information:
    - ✓ name of registered producers and production area;
    - ✓ signature of registered producers audited;
    - ✓ date of audit;
    - ✓ name of internal auditor;
    - ✓ registered produce;
    - ✓ result of internal audit;
    - ✓ each audited checklist to give remarks/ recommendations;
    - ✓ detail of non-compliance with requirements and time for corrective action; and
    - ✓ on the basis of the internal audit report, the decision on whether the producer is in compliance.

- **Competency of internal auditors** – These need to be defined and records maintained of current internal auditors and their competencies. Competency requirements of an internal auditor include:
  - level of education;
  - technical qualification and training on GAP, specific management system, agricultural practices related to scope of certification (e.g. plant protection, fertilization, IPM, irrigation, postharvest technologies);
  - working experience of at least two years; and
  - skills including communication and questioning skills.

- **Non compliances and corrective action** - Procedure to analyze non-compliance with requirements and identify the root cause of non-compliance so that appropriate corrective action can be taken to ensure that there will not be any reoccurrence of the non-compliance. Steps for taking corrective actions are:
  - NCs to be evaluated for root cause of non-compliance;
  - on the basis of the root cause define the corrective action and the timeframe for action; and
  - define responsibility for taking corrective action.

Sanctions and Infringement

- Producer group shall provide systems for sanctions for member not complying with certification requirements.
- There should be a contract between each producer and producer group to indicate sanction procedures for warning, suspension and withdrawal.
- Once a producer member is suspended or certificate revoked, there needs to be a mechanism/ procedures to promptly notify CB of suspension or revocation of its registered member.
- All information pertaining to non-compliance, corrective action, and decision process shall be recorded.

- **Identification and traceability of produce** – Produce shall be traceable to each individual registered producer and their farm. Procedures for identifying registered produce and tracing all produce for both compliance and non-compliance to the production area shall be in place. The harvesting area shall be managed for registered produce so that produce are identifiable and traceable from the purchase order through post-harvest handling, storage and distribution. Effective systems and procedures shall be in place to reduce the risk of wrong labelling or mixing up of GAP and non-GAP produce.

- **Withdrawal procedures and system** – The internal control system should include written procedures for withdrawal of an individual producer's certificate and/or withdrawal of certified produce. This will include form of violation which will induce withdrawal, the person responsible for the withdrawal process, notification of withdrawal to customer and CB and arrangement for renewing certification.

- **Subcontracting** – If subcontractors are used, a subcontracting procedure needs to be in place with the following requirements:
  - such external services to be in compliance with GAP certification requirements;
  - assessment of subcontractor competency and records of the same to be maintained; and

- subcontractor to operate in compliance with the group's QMS and relevant procedures and this shall be specified in contracts between producer group and subcontractor.

12.4 Practical exercise 1

1. Form into four or five groups.
2. Assume that you are to start a GAP certification body, write what steps would be required for certification of individual farmer certification (option1). State briefly what documents you would need for each step.
3. Present to the other groups and open for discussion.

12.5 Practical exercise 2

1. Continue with the same four or five groups.
2. Your GAP certification body would now like to expand its scope to certify producer groups. State what additional requirements would be applicable to producer group for you to grant them certification.
3. Present to the other groups and open for discussion.

12.6 Training slides

The training slides in relation to this section are given in Annex 12.

Session 13 Implementation by individual producer and producer group

Session time : 135 minutes

13.1 Purpose

The purpose of this session is to:

- create an awareness and understanding on the requirements for GAP implementation;
- increase capacity of national/government/focal points in countries regarding requirements for GAP certification; and
- assist producers to implement GAP with the focus on certification requirements.

13.2 Implementation by individual producer

Supermarket chains and consumers are increasingly requiring that their suppliers implement GAP. In addition, each individual retail company may impose even more stringent quality requirements on its suppliers so as to differentiate its products from that of its competitors.

13.3 Requirements for GAP implementation

Implementing GAP needs the individual producers to implement the following set of requirements:

- GAP standard requirements (ASEANGAP/National GAP);
- certification body requirements (more specific for the producer group rather than individual producer);
- applicable regulatory requirements of the country where produce is produced and sold/traded;
- customer requirements; and
- producers' own requirements, if any, to ensure system will stay together and improve (system binding documents).

Implementation of these requirements needs to be consistent, effective and demonstrable. For this purpose it is proposed that even the individual producers preparing for GAP, should implement the system elements, namely document and record control, internal audit, management review and corrective actions. For individual producers, these systems can be simple and effective and even if not perfect, the certification body would not identify the imperfections as non-compliances since it is not a requirement, and with time the producer would be able to improve the systems controls.

13.4 Documents required for GAP implementation

Documentation includes two aspects, namely procedural documents that will guide the producer or producer group on the process or what needs to be done and how to do it, and records that reflect what has

been done on a daily basis. The records provide useful information for farmers for their own recollection as well as demonstrate that requirements have been implemented. Documents will depend on the GAP scheme (National GAP, ASEANGAP or any other GAP) that the producer or producer group would like to be certified against and the option that the producer chooses for certification – individual producer or producer group. Unnecessary documents or documents with too many details may not be efficient and only the required information should be given.

Documents will include:

- **a manual** that outlines the entire operation to be followed by producer or producer group and how it is to be managed;
- **procedures** that give a general guideline of how to perform a task – these can refer to standard operating procedures (SOP) for a specific task, e.g. procedure to conduct review
- **SOP** or instructions – these give specific instructions on how to do a specific task, e.g. cleaning of spraying equipment
- **checklists** that are generally a list of points to remember or an "aide memoire"; and
- **formats** that give the structure on which the details are to be kept or can be followed.

As indicated in Session 12, the requirements for control of documents include the need for all documents to be approved; current versions to be identifiable with document number, approval date, volume number and page number; to be distributed to the people who should have these; any changes to be reapproved by same authority that initially approved them; and obsolete documents to be removed from circulation and replaced by latest versions.

The documents for GAP implementation include those required by the GAP standard, those required by the certification body for individual or group producers and the management system documents. The documents required under the GAP scheme will normally consist of farm plan, risk assessment record, personal hygiene instructions, waste management plan, job responsibilities, cleaning and pest control plan and a quality plan. Those required by a certification body for an individual producer include application form and details of produce and farm whereas for a producer group these include procedures for internal audit, management review, document control, record control, corrective actions, identification and traceability, revocation/withdrawal and subcontracting. These are also the systems management documents.

Similarly, records for GAP implementation include those required by the GAP scheme, those required by the certification body depending on the individual or group producer and the management system records. The records under the GAP scheme consist of farm plan, planting material record, irrigation records, chemical inventory, spray records, pest and disease monitoring record, post-harvest chemical record, chemical authorization form, fertilizer and soil additives record, harvesting and packing record, job responsibility and training record, cleaning and pest control plan, corrective action report, etc. Those required by a certification body for a producer group include internal audit, management review, document control, record control, corrective action, identification and traceability, revocation/withdrawal, subcontracting records.

13.5 Implementation of internal control system (ICS) by producer group

If applicants would like to apply for certification option 2 (producer group), they would need to implement more than the requirements stated above. Additionally, they would need to develop and implement an internal control system for the producer group. The benefit of applying as a group is that the cost is reduced.

The certification body does not audit each farm in the producer group but samples a defined number of producers, which reduces time and therefore costs. However, in order to be confident that the remaining producers are also following the GAP requirements, the certification body requires the group to implement an internal control system, which the certification body would audit. In other words, the internal control system of the producer acts as a local (internal) certification body with a defined system and records.

Implementation is best done in a Plan-Do-Check-Act (PDCA) cycle implementing bit by bit and sustaining it before implementing the next set of requirements and then following the cycle again.

Plan – understand the requirements and plan to implement these and conduct training to bring about awareness to the personnel working on the farm.
Do – implement these requirements.
Check – verify whether the requirements are being implemented effectively (could be done with a checklist).
Act – depending on the above findings, take corrective actions to make improvements or close gaps.

The **basic activities for implementation** are as follows:

- identify qualified personnel for ICS and ensure that they have training on both GAP and ICS development;
- identify farmers who want to participate in the GAP certification scheme and support their awareness/ training on GAP;
- develop criteria and conditions for ICS and relevant documents/ forms to be included in the ICS manual (initially simple);
- ICS staff to be fully aware of all minimum requirements prior to initial audit; and
- all documents (criteria and conditions, working procedures, forms, etc.) and operations of ICS staff to be gradually improved over time.

ICS manual development

An ICS manual is a prerequisite for group certification. The manual should contain an overview of the GAP scheme including an overview of farms and agricultural practices of participating farmers as well as an overview of purchasing, handling and exports - all the steps that take place from harvest until the final sale of the product to another entity. The manual needs to be available to members of the GAP Approval Committee and internal auditor and available upon request to farmers/operators/organizations that are parts of the scheme. The manual needs to be reviewed on a regular basis and updated when necessary and changes communicated to all concerned.

Risk management

Basic risk assessment and continuous risk management – A detailed initial risk assessment (RA) must be done to identify risks at farm level, during purchasing, processing or (export), transporting, as long as the product is under the responsibility of the ICS operator. The ICS covers all measures to minimize the identified risks. The initial RA is the first step toward raising awareness of critical aspects to be covered in the ICS and identifying the critical control points. It is recommended to repeat the RA exercise regularly. The ICS operator needs to be aware of critical control points.

Internal GAP standard

The internal GAP standard is the reference standard for internal control. It includes the farm production requirements of the relevant external regulations/standards for certification. It should be presented in adequate form for understanding by ICS staff. The requirements of the internal standard and the practical implications for the farmers should be communicated clearly to them in the local language. The internal standard should address the production units/crops under farm management and certification, the farm practices (e.g. seeds, fertilization, sustainable soil management, plant-protection) and the harvest/post-harvest procedures. Under the scope of certification, all regulations/standards pertaining to GAP certification need to be listed in the ICS manual.

Farm control and approval procedures

Registration of new farmers – All farmers under the system, i.e. those to be certified, need to be formally registered as GAP farmers. The total area under each farmer management, crops with area and basic farming methods need to be recorded on a farm data sheet. A commitment declaration (contract) must be signed between each farmer and the ICS operator in a language understood by the farmer. An overview map (village or community map) showing each farm location, and if farm data changes considerably, a new farm data sheet is to be completed, or data in files updated. Yield estimates for the crop of each farmer shall be provided.

Internal audit **–** Each registered farmer is to be assessed at least once a year by qualified internal auditors and this should be done in the presence of the farmer or his/her representative. The visit should include the entire farm including storage of inputs, harvested products and a brief check of post-harvest handling. The visit needs to be documented in the farm audit checklist and signed by the internal auditor and the farmer /his/her representative. If any major non-compliances (NCs) are found, these are reported immediately to the ICS manager and measures taken as per internal sanction procedures.

Internal approval procedures to approve or sanction farmers need to be defined. Appropriate corrective or mitigating measures for non-compliances and sanctions shall be defined by ICS. The internal control system should be documented and all relevant documentation for each certified farmer should be available for audit.

Organization and ICS personnel

A person should be made responsible for each procedure or task of the ICS and staff should be aware of their responsibilities and qualified for the job. An organizational chart (or similar) of the operator's organization needs to be available. An ICS coordinator or ICS manager should be assigned. There should be sufficient qualified internal auditors. There needs to be a qualified person ("GAP approval manager") or certification committee. Training of farmers in GAP farming is crucial so the position of field officer (extension specialist or field advisor) is very important. The ICS personnel must not have any conflict of interest that might hinder the work.

Training

Training is important both for ICS personnel and farmers. For ICS personnel, each internal auditor needs to receive at least one training course per year by a competent person. For farmers, the most important aim of GAP certification is to improve the farmer's knowledge and understanding of GAP

Purchasing, handling, processing, export

The organization that will buy the produce from certified smallholders, then process and store these products and market them as GAP products needs to define procedures in order to guarantee the integrity of the certified product in all steps of product flow and avoid mixing between different qualities (GAP/non-GAP). These will need to cover purchasing procedures, storage and handling procedures, processing, exports – with the basic aim to ensure the GAP status of the product and compliance with respective documented requirements. In addition, export of GAP produce is according to some standards (e.g. European Union Regulation) and these will be subject to inspection by the certification body. The purchasing, handling and processing personnel have an important role in ensuring correct purchasing of GAP produce from farmers. It may be necessary to specifically assign a GAP warehouse manager who understands the GAP handling procedures. If there is a processing unit operated by the ICS operator it may be necessary to specifically assign a GAP processing manager for the same.

External audit and certification

During the external audit by the CB, the effectiveness of the ICS is to be evaluated. The external auditor will re-inspect a certain number of farmers to be determined on the basis of a risk assessment.

13.6 Practical exercise 1

1. Form into four or five groups.
2. Each group is assigned one procedure that is required to be maintained by producers.
3. The group to make a draft procedure following the document control procedure.
4. Present to the other groups and open for discussion.

13.7 Practical exercise 2

1. Form into four or five groups.
2. Each group is assigned a couple of records that are required to be maintained by producers.
3. The group to make sample records following the record control procedure.
4. Present to the other groups and open for discussion.

13.8 Training slides

The training slides in relation to this section are given in Annex 13.

Session 14

Field trip

Full day

14.1 Purpose

The purpose of the field trip is to:

- observe the implementation of GAP at some certified farms – both individual and producer group – during various stages of production, harvesting and post-harvest handling of fresh produce;
- observe the documentation (procedures and records) maintained by the GAP certified producer;
- compare the good agricultural practices implemented at the location(s) visited with the requirements of ASEANGAP; and
- assess the benefits of GAP implementation and certification for producers.

14.2 Instructions

The field trip visit is organized to see both farms and a packhouse or packing shed. Participants form groups (four or five persons per group) and each group is assigned one of the modules – food safety, the environment, workers' health, safety and welfare and produce quality – for the place they visit.

During the visit to each location, they will identify the hazards at each step or activity and look for practices that might have adverse impacts related to their module.

Participants may see examples of good agricultural practices or poor practices that increase the risk of hazards occurring and these are to be discussed by group members and notes made for future reference. Some regular practices may not take place during the visit so participants should use the opportunity to ask questions about practices/documentation.

During the visit participants should :

- remember that they are guests at their location with the intent to learn;
- stay out of the way of workers and not disturb their activities;
- obey signs or instructions if present;
- not touch produce;
- avoid asking inappropriate questions, or making unsuitable comments or gestures to the farmer or workers;
- observe only and not comment or criticize;
- stay with their groups and not wander about alone; and
- board the transport as planned.

14.3 Practical exercise

Use the checklist developed during the training programme or the one on the following pages to help you observe practices and ask questions. There will be a short discussion and presentation of findings by each group for 60 minutes on the day after the field trip. The following tasks should be completed prior to and during the field visit:

Task 1: Before going on the field trip

Read through the checklists and add any additional questions or points considered to be important.

Task 2: During the visit to the farm or packing shed

Using the checklist, observe and record the practices and conditions on the farm that are relevant to the module assigned.

At the end of the visit, consolidate observations, put them on PowerPoint presentation or flip chart and present these during the group discussion.

14.4 Sample checklist

Field trip checklist

Visit number: _____ **Location:** _____

Crops grown/ packed: _____ **Date of visit:** _____

Good agricultural practices	Comments
Site history and management	
Layout map showing the location of various sites	
Planting material – source and records available	
Soil and substrates - any risk of contamination with persistent chemicals, heavy metals or pathogenic micro-organisms?	
Fertilizers and soil additives – check for animal manure, compost heaps, untreated organic manure and their risk, if any	
Water – check source, records of testing, any risk of contamination	
Agrochemicals – check records of usage (parameters), how are they stored, check labels, disposal of used packs/containers	
Other chemicals (fuel, oil, and grease) – handling and storage	
Equipment, containers and materials – materials of construction, cleaning and methods of cleaning & sanitation	
Animals and pests – presence of grazing or domestic animals, pest control measures used, records,	
Personal hygiene – written instructions, toilet and hand washing facilities, training records **Produce treatment** – water used, chemicals used	
Storage and transport – storage conditions, cross contamination, is material placed on ground, transport used	
Traceability & recall – system followed	
GAP procedures	
GAP manual	
Farm plan	
Risk analysis records	
Personal hygiene instructions	

Good agricultural practices	Comments
Cleaning plan	
Waste management procedure	
For producer group check internal control system documents	
Records	
GAP records • Farm plan • Planting material record • Irrigation records • Chemical inventory • Spray record • Pest and disease monitoring record • Post-harvest chemical record • Chemical authorization form • Fertilizer and soil additives record • Harvesting and packing record • Job responsibility and training record • Cleaning and pest control plan • Corrective action report • Other	
Systems management records • Internal audit records • Management review records • Document control records • Record control records • Corrective action records • Identification and traceability records • Revocation/withdrawal records • Subcontracting records	
Other comments	

14.5 Training slides

The training slides in relation to this section are given in Annex 14.

Session 15

Accreditation – Importance and requirements

Session time : 90 minutes

15.1 Purpose

The purpose of this session is to:

- create awareness and understanding of the importance of accreditation; and
- build an understanding of governments/certification bodies of the requirements of accreditation.

15.2 Accreditation importance

Accreditation is "third party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks".

Accreditation is the preferred mechanism for ensuring public confidence in the reliability of activities that impact on health, welfare, security and the environment. Accreditation gives consumers confidence through ensuring consistent standards in the quality and safety of products or services purchased. Some additional benefits are as follows:

- Accreditation is an essential tool for decision-making and risk management.
- Organizations save time and money by selecting an accredited certification body.
- Accreditation is objective proof that a certification body has competence to comply with best practice of GAP certification.
- It is the internationally recognized system that is used to develop and sustain standards of performance.

Accreditation can be obtained for the following activities of inspection, testing and certifications:

- Inspection body – ISO 17020
- Management systems certification body – ISO 17021
- Product/ process/ service certification body – ISO 17065
- Personnel certification body – ISO 17024
- Testing and calibration laboratories – ISO 17025

Depending on the activity being performed by the CB, it would need to reference different ISO standards when applying for accreditation of that activity. Details available in slide.

15.3 Accreditation requirements

To become an accredited product certification body, the CB must be able to demonstrate its competence to assess and certify the produce presented to it and comply with the requirements of ISO/IEC 17065 (Conformity assessment - Requirements for bodies certifying products, processes and services). For detailed requirements refer to the standard.

In brief the requirements are given under the following five broad headings:

General requirements – related to legal and contractual matters, management of impartiality, liability and financing, non-discriminatory conditions, confidentiality, publically available information.

Structural requirements – related to organizational structure and top management, mechanism for safeguarding impartiality.

Resource requirements – covering CB personnel, resources for evaluation (both internal and outsourced).

Process requirements – covering application, application review, evaluation, review of evaluation, certification decisions, certification documentation, maintain directory of certified products, surveillance, changes affecting certification, termination/ reduction/ suspension or withdrawal of certification, records maintenance, complaints and appeals.

Management systems requirements – The aim under this is that the CB shall establish and maintain a management system that is capable of achieving the consistent fulfillment of requirements of the standard through either Option A or B. Under Option A, the requirements for general management systems documentation, control of documents, control of records, management review, internal audit, corrective actions and preventive actions are to be addressed. Under Option B, a CB that operates a management system as per ISO 9001 (Quality management systems - Requirements) can use that system to demonstrate fulfillment of the above management systems requirements as given in ISO 17065.

15.4 Training slides

The training slides in relation to this section are given in Annex 15.

Session 16

Preparing a certification body for setting up GAP certification and the accreditation process

Session time : 60 minutes

16.1 Purpose

The purpose of this session is to:

- assist governments/certification bodies to set up a system for GAP certification in line with accreditation norms and requirements.

16.2 Identification of a certification body

The first step is to choose the entity that will function as a GAP certification body – it may be a governmental organization such as the Department of Agriculture or a private certification body responsible for various certifications. The entity needs to be legal and needs to define its structure and organization to ensure it meets with the requirements of independence, impartiality and non-conflict of interests. It is important to ensure its financial stability and arrange for liability cover. It needs to have a clear organization structure with the required competencies and clearly defined roles and responsibilities of the various personnel.

16.3 Preparing the CB for GAP certification

Preparing a CB for GAP certification would involve the following steps:

- identifying and defining the CB as per the requirements of ISO 17065; and
- developing the quality systems and the certification process system as per the requirements of ISO 17065.

The certification process system should include all activities required by the CB for conducting GAP certification. These activities would need to be in line with the requirements of ISO 17065 given in session 15. The basic procedures and requirements/materials to be developed are given below:

- marketing material giving up-to-date description of the GAP evaluation and certification process;
- methods/process of receiving enquiry from individual producer or producer group and defining both these along with their requirements;
- developing application method/process along with application format with all information regarding applicant as required by ISO 17065;
- method / process of evaluating the enquiry to ensure CB capability and scope;
- method of calculating the assessment man-days;
- method/process and format for proposal or contract with producer or producer group including fees, terms and conditions
- method/process of selecting auditors for the assessment, their roles and responsibilities, their competency required, evaluation and monitoring methods;
- procedure for announcing the assessment date and timetable giving details of auditors allocated for the assessment;

- procedure for actual assessment including opening meeting, assessment including checklists, non-conformity reporting and report writing and closing meeting;
- procedure for evaluating the report and recommendation by persons not involved with actual assessment – decision on certification;
- procedure and conditions for granting, maintaining, extending, suspending and withdrawing certification;
- procedure for enabling surveillance to be carried out in accordance with the applicable criteria to certification system;
- procedure for changes in certification requirements;
- procedure for use of licenses, certification and mark of conformity – to include terms and conditions;
- if need subcontracting, procedure for the same;
- procedure for determining, maintaining and upgrading competency of persons involved in certification process – scrutiny of application, planning audit, auditors, decision-maker.
- certain general provisions including policy of non-discrimination;
- organizations' requirements on various aspects such as the structure, management, impartiality, financial stability, liability cover, competency of personnel, policy of confidentiality and no conflict of interest; and
- detailed system on control of operations to evaluate the compliance of an applicant to the requirements of GAP and grant them the certificate.

In addition, procedures for the following management systems aspects will also be required:

- general management systems documentation (manual, policies, definition of responsibilities, etc.);
- document and record control procedure;
- procedure for handling non-conformity and corrective and preventive actions taken;
- procedure for handling customer complaints, appeals and disputes;
- internal audit procedure – in line with ISO 19011; and
- management review procedure.

Once the procedures are documented and implemented for a couple of certifications, the CB should apply for accreditation.

16.4 Accreditation process

Once the CB is formed and its systems developed and implemented, it can apply for accreditation. The accreditation process has the following steps:

- Enquiry – the certification body should enquire into the possibility of accreditation from the desired AB.
- Application – the certification body should fill an application form giving details of the scope of accreditation they wish to apply for. Based on this application form the AB would give a quote with the terms and conditions of the accreditation process.
- Pre-assessment – the AB may conduct a pre-assessment to look at specific issues or discuss document review.
- Assessment – document review, office assessment and witness assessment of CB conducting an audit would be a part of the actual verification of the systems followed by the CB. Office assessment includes four steps, namely arranging an opening meeting, assessing/auditing, evaluating results and arranging a closing meeting.

- Clearance of non-conformities – any gaps identified during assessment would need corrective actions to be taken by the CB and clearance of the non-conformity by the accreditation board.
- Recommendations to accreditation board – once satisfied the assessors would put forward their report for decision-making.
- Evaluation of recommendation and award of accreditation – decision-making would involve evaluation of recommendation and award of accreditation certificate.
- Maintenance of accreditation status – the CB needs to maintain its system and the accreditation status and undergo surveillance and recertification audits at defined intervals.
- Extending scope of accreditation – CB needs to develop and implement required changes to extend its scope of accreditation such as get/develop competency of auditors for the extended scope etc.

ISO 17065 requirements related to each of the steps need to be followed.

16.5 Practical exercise

1. Form into four or five groups.
2. Assume that you are a GAP certification body, you have decided on the steps for certification of individual farmer certification (option 1) and producer group (option 2). Describe briefly the procedure for the following:
    - ✓ Application method and format
    - ✓ Selecting auditors
    - ✓ Handling complaints, appeals and disputes
    - ✓ Confidentiality requirement
    - ✓ Terms and conditions for use of licenses, certificates and mark of conformity
3. Present to the other groups and open for discussion.

16.6 Training slides

The training slides in relation to this section are given in Annex 16.

Session 17

Benefits of GAP

Session time : 45 minutes

17.1 Purpose

The purpose of this session is to:

- illustrate the benefits of implementing GAP and being GAP certified.

17.2 Benefits of GAP

GAP actually won't increase consumer demand for fresh produce unless growers let buyers know that they have taken steps to improve food safety on their farms. Consumers usually have no way to know whether or not fresh produce is grown with GAP. Third-party GAP certification offers a way for growers to let buyers know that they follow appropriate food safety practices on their farms. Growers must measure the economic cost against the benefits before deciding whether to pursue certification.

GAP adoption and certification offers three primary benefits: (1) economic risk reduction; (2) improved market access opportunities; and (3) improved fresh fruits and vegetables safety and quality.

17.3 Economic risk reduction

Although GAP and third-party certification do not guarantee food safety, they do reduce the risk that a food-borne disease outbreak will originate on the farm. The risk of large economic losses – such as a catastrophic drop in sales (especially if contaminated produce is traced to the farm's operations), damage to the farm's reputation, and potential lawsuits – is also reduced with GAP adoption and certification. However, the benefit from risk reduction accrues to the grower only in the event of an outbreak. To estimate the economic benefit of GAP adoption certification more accurately, a grower needs to calculate the farm's potential economic losses in case of an outbreak, both with and without GAP certification. Accurately estimating the probability of an outbreak is practically impossible, so the benefit of GAP certification often depends on the grower's own perception of the outbreak risk.

Another important, but subtle, benefit of GAP adoption and certification is what economists call the "positive externality" effect to the entire fresh-produce industry. Each grower who becomes certified reduces his or her farm's risk of spreading food-borne illness and, therefore, lowers the risk of an outbreak that affects the entire community of growers. In contrast, if a grower does not adopt GAP and doesn't become certified, when an outbreak is traced back to his or her farm, both the non-compliant producer and the industry as a whole suffer, which is known as the "negative externality" effect.

17.4 Improved market access opportunities

GAP certification opens markets for producers to expand sales to major supermarket chains, school systems, restaurants, and other market outlets. Many retailers and foodservice buyers now require third-party GAP certification as a condition of purchase.

In 1999, for example, Safeway, the third-largest food retailer in the United States, expanded its food safety programme, requiring all suppliers of certain food commodities to verify that they follow government food safety standards and specifications in production and packing. Other large retailers have followed suit. Research covering a select group of fruit and vegetable shippers in the United States indicated that in 1999, almost half of those studied provided third-party audits for GAP for at least one of their buyers. Although shippers were not always happy about complying with this request, most indicated that they would implement verification programmes in response to changing buyer preferences. In this study, shippers tried to distance themselves from growers with no third-party GAP certification. These shippers recognized that they could reduce risk by requiring growers to provide third-party audits for GAP. Only growers with this type of third party certification can take advantage of the market opportunities these shippers offer.

Although growers could conceivably conduct their own food safety and GAP audits, third-party audits by reputable companies, individuals, or groups are more credible. An important issue for growers is finding a reputable third party to do the GAP certification.

17.5 Improved safety and quality

One of the major benefits of implementing GAP is the improved safety and quality of the products. GAP enables identifying the hazards during production and post-harvest stages and addressing these through implementation of good practices in terms of pest control measures, hygienic practices, use of approved chemicals and in quantities appropriate to the practices recommended, proper storage practices among others, thereby improving the safety and quality of the produce. It also facilitates traceability of the produce to farm level through maintenance of appropriate records and a labelling system so that in the event that the product is found to contain any contaminant or hazard, it can be traced back to the farm and the reasons or causes of any contaminant or hazard investigated and appropriate actions taken for rectification.

17.6 Economic costs

Weighing against the potential benefits of GAP adoption and certification are the costs, which are often immediate and sometimes large. When a grower decides to have a third-party audit, the first step is to implement GAP in the production process. Costs of adopting GAP can include large capital investments, such as water purification equipment, or more moderate expenditures, such as training workers to improve hygiene and upgrading record-keeping technologies. There is no “one-size fits all” set of practices that allow growers to become automatically GAP certified. Growers are free to choose the most cost-effective combination of practices to satisfy GAP requirements. Therefore, two growers in different areas with different environmental conditions could both adhere to GAP principles and be certified, but use different methods to do so.

Another important immediate cost of third-party GAP certification is hiring the certifier. Typically, growers hire third-party firms to first evaluate the food safety systems in their operations and suggest ways to meet GAP guidelines. In 2001, a United States Food and Drug Administration (FDA) report estimated the cost of third-party GAP evaluation at US$300 to US$500 per farm.[6] An evaluation would include the documentation necessary to assure continuous compliance with GAP. Once they implement GAP, growers can decide to have their operations certified by third parties or periodically audited for compliance. Although not current, these figures provide an idea of the immediate certification costs.

17.7 GAP and market requirements

Fruits and vegetables are produced both for domestic and export markets. In the domestic sector, the different sectors include traditional markets – individual shops in market places (wet markets), supermarket chains or organized retail, international markets, hotels, food service and high-value markets.

To actually ensure that the product is acceptable in domestic as well as global markets, it is important to assess the requirements of these markets in terms of legislative and buyer requirements for both safety and quality parameters and work towards meeting these. The legislative requirements will cover aspects such as pesticide residues, heavy metals, packaging and labelling; and consumer requirements would cover more of the quality related organoleptic aspects such as size, shape, colour, firmness, blemishes, flavour, etc. For high value markets there is tremendous pressure to improve quality and safety standards in order to participate in this more lucrative and growing market segment.

17.8 Training slides

The training slides in relation to this section are given in Annex 17.

[6] U.S. Food and Drug Administration (FDA). 2001. Analysis and Evaluation of Preventive Control Measures for Control and Reduction/ Elimination of Microbial Hazards on Fresh and Fresh-Cut Produce. Center for Food Safety and Applied Nutrition, U.S. FDA, Washington DC.

Session 18

Evaluation and feedback

Session time : 30 minutes

Evaluation form

5 Timing of the training					**Appropriate**	**Inappropriate**
2. Duration of the training				**Too long**	**Adequate**	**Too short**
3. How do you evaluate the quality of the training in general?						
		Excellent	**Very good**	**Adequate**	**Poor**	**Very poor**
3a	Subject coverage					
3b	Material and handouts					
3c	Organization of the programme					
3d	Technical inputs by experts					
3e	Contribution of country participants					
4. Conduct of the training						
		Excellent	**Very good**	**Satisfactory**	**Acceptable**	**Less than desired**
4a	General atmosphere of the training					
4b	Sensitivity to specific country issues					
4c	Opportunity for participants to raise technical issues					
5. Please rate the training in terms of:						
		Very useful	**Useful**	**Satisfactory**	**Somewhat useful**	**Inadequate**
5a	Introduction of ASEANGAP and its interpretive guide					
5b	Enhancement of your skill					
5c	Clarification on technical issues					
5d	Long-term usefulness in your professional work					
5e	Exchange of ideas, experiences and views					

6	**Please indicate your views on the following indicators:**				
		Very high	**High**	**Average**	**Low**
6a	Level of relevance of the training to your country's current agenda on GAP				
6b	Level of relevance of the workshop to your professional work				
6c	Appropriateness of the learning format of this training based on an interactive and knowledge sharing approach				

7	**Knowledge**		
		Yes	**No**
7a	Do you think you will be able to **apply** and share the information from this training with your colleagues back in your country?		
	If yes, in what way? Please explain:		

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ANNEXES

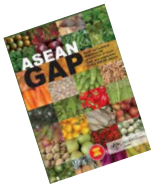
Annex 1 Answers to recap questionnaire – Section 10

Answer 1	TRUE
Answer 2	FALSE
Answer 3	FALSE
Answer 4	FALSE
Answer 5	TRUE
Answer 6	TRUE
Answer 7	FALSE
Answer 8	TRUE
Answer 9	TRUE
Answer 10	TRUE
Answer 11	FALSE
Answer 12	TRUE
Answer 13	FALSE
Answer 14	TRUE
Answer 15	TRUE
Answer 16	TRUE
Answer 17	TRUE
Answer 18	FALSE
Answer 19	TRUE
Answer 20	TRUE

Annex 2 Training slides on Introduction to the training course, resource persons and participants

Implementing GAP in Fruit & Vegetable Sector

Its Certification and Accreditation

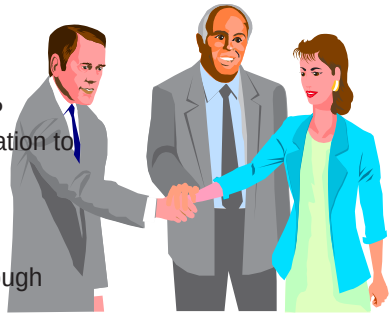


Session 1

Introduction to training course, resource persons and participants

Introductions

- Name/ country/ Organization
- Exposure to GAP specifically in relation to certification/ accreditation
- What are your expectations through this training



Training Objective

- Strengthen the capacity of the horticulture sector – public & private to adopt and promote GAP certification
- Strengthen institutional capacity on certification in line with accreditation requirements.
- Provide training to trainers to support producers who are intending to implement GAP with a view to assure safe production, harvesting, handling, storage & transport of fresh fruits & vegetables – focus on certification
- Transfer the knowledge gained on successful practices in the countries of the region
- Validate the training on Implementing GAP in fruit and vegetable sector

Learning Outcome

- Assist producers (individuals and producer groups) to implement GAP with a view to achieving certification
- Support the government in setting up GAP certification programmes in line with accreditation requirements
- Lead teams attempting to consolidate strategies for national codes of practice, guidelines & quality & safety programs & initiatives in relation to GAP specifically wrt certification
- Organize training courses on GAP, tailored to the needs of each country through this validated training programme

About the Course Material

- Training manual published which provides information to support the delivery of the training course and includes:
  - ➢notes on each session;
  - ➢Powerpoint presentations; and
  - ➢references and other information sources.

NOTE : – Please read the sildes horizontally

Training Programme

DAY 1

- Introduction to training course, resource persons and participants
- Background to food safety and introduction to GAP
- Different GAP standards – GlobalGAP, ASEANGAP and various ASEAN country National GAPs
- Relation between quality, safety and GAP
- ASEANGAP – Food Safety Module

Training Programme

DAY 2

- ASEANGAP – Environmental management module
- ASEANGAP – Worker health, safety and welfare module
- ASEANGAP – Produce quality module
- Recap on ASEANGAP, concept of control points in GlobalGAP and review questionnaire
- Certification, Implementation and Accreditation – An overview and introduction

Training Programme

DAY 3

- Certification – Requirements (individual and producer group)
- Implementation by individual producers and producer group

DAY 4

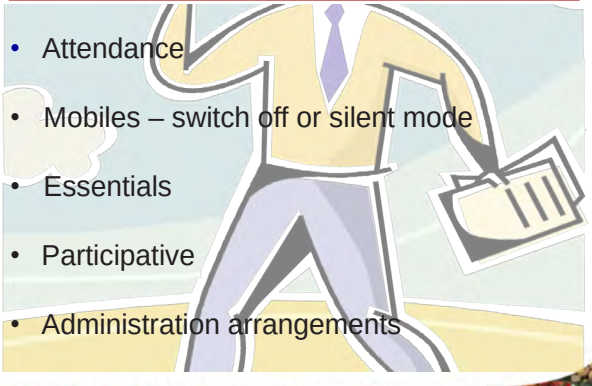
- Field visit to certified farms (individual and group) to understand the systems in practice

Training Programme

DAY 5

- Discussions on field visit vs-a-vs the implementation of GAP requirements
- Accreditation, its importance and requirements
- Preparing a certification body for setting up GAP certification and the accreditation process
- Benefits of GAP
- Evaluation and feedback
- Closing speeches and awarding of certificates

Training Etiquettes



- Attendance
- Mobiles – switch off or silent mode
- Essentials
- Participative
- Administration arrangements

Questions and Doubts

Session 2

Background to Food Safety and Introduction to GAP

Purpose of module

- To introduce the concept of GAP in relation to food safety
- Give a background and importance of food safety to understand the role of GAP

Contents of the module

- Globalization and its influence on food safety
- Food safety and major food safety concerns
- Preventative risk based approach in the food chain in relation to food safety
- Responsibilities of stakeholders
- Introduction to GAP

Good Agricultural Practices

Good Agricultural Practices

Practices that need to be applied on farm to ensure food safety during pre production, production, harvest and post harvest. In many cases such practices also help to protect the environment and safety of the workers.

A **systematic approach** which aims at applying available knowledge to address **environmental**, **economic** & **social sustainability** dimensions for on farm production & post production process, resulting in **SAFE** & **quality** food & non food agricultural products

How it all started - Globalization

- Establishment of WTO - Dismantling of barriers for free flow of trade - global market – new hazard, innovations
- Rapid spread of contaminants worldwide by movement of food

Impact

- Contaminants/hazards enter food chain – result in
  - ➢Risks to human Health (food safety)
  - ➢Economic impact (product destruction, market losses, etc)
  - ➢Less availability of food due to contaminants
- Governments/private sector imposing regulatory requirements for health & safety
- To prevent indiscriminate use, rules & disciplines laid down in Non-tariff agreements–SPS/ TBT

Sanitary & Phytosanitary Measures (SPS) Agreement

- Governs measures intend to protect human/animal/plant health or life
- Basic Rights & Obligations
- Harmonization (Codex, OIE, IPPC)

  Higher standards based on risk assessment
- Regionalization
- Transparency
- Equivalence

Technical Barriers to Trade (TBT) agreement

- Objective – prevent use of standards as unjustified technical barriers to trade
- Covers all types of standards
- Technical regulations should
  - Meet the purpose
  - Impact/implementation cost proportional to purpose
  - Be applied on Most Favored Nation treatment basis
  - Not cause unnecessary obstacles to trade
  - Based on scientific information & evidence

Identify SPS or TBT ??

- Regulation regarding fertilizers residues in foods
- Regulation regarding heavy metals in fruits & vegetables
- Regulation regarding efficacy of a fertilizer
- Regulation regarding risk to handlers of fertilizers
- Labeling of Nutrient levels in food
- Labeling of storage temperature
- Fumigation of containers for shipments
- Size of fruits and vegetables

SPS or TBT ?

SPS Measures

- ❖human or animal health from food-borne risks
- ❖human health from animal- or plant-carried diseases
- ❖animals and plants from pests or diseases
- ❖examples:
  - ❖pesticide residues
  - ❖food additives

TBT Measures

- ❖human disease control (unless it's food safety)
- ❖nutritional claims
- ❖food packaging and quality examples:
  - ❖labelling (unless related to food safety)
  - ❖pesticide handling
  - ❖seat belts

Codex Alimentarius Commission

- Intergovernmental body single reference point
- **Founded** in 1963
- **Membership** - 185 countries + 1 member organization (EC)
- **Programme Objectives**
  - ➢protect the health of consumers
  - ➢ensure fair practices in international food trade
  - ➢coordinate all food standardization work at the international level
- **Purpose** is to develop standards & Code of Practices for food

Codex Work on Fruits & Vegetables

- Has two commodity committees on Fruits & Vegetables –
  - ➢fresh fruits & vegetables (CCFFV – host Government Mexico) &
  - ➢processed fruits and vegetables (CCPFV – host Government USA)
- Various Standards, guidelines, recommended code of practices, standards and MRLs for fresh fruits & vegetables. Some of these include:
  - ➢Special Publication on fresh fruits and vegetables 1st edition (27 Standards on fresh fruits & vegetables)

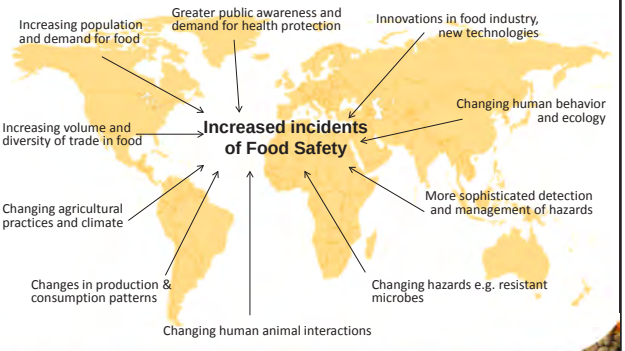
Codex Work on Fruits & Vegetables

- Further list of standards related to fruits & vegetables
  - ➢Standard for Fruit juices & necter – Codex Stan 247-2005
  - ➢Recommended International Code of Practice for packaging & Transport of Fresh Fruits & Vegetables CAC/RCP 44-1995
  - ➢Code of Hygienic Practice for Fresh Fruits and Vegetables CAC/RCP 53-2003
  - ➢MRLs for pesticides (CAC/MRL 1-2009), extraneous MRLs (CAC/MRL 3-2001)

Other related Codex Standards

- **Traceability** - Principles for traceability/ product tracing as a tool within a food inspection & certification system (CAC/GL 60 – 2006)
- **Risk analysis**
  - ➢ Working principles for risk analysis;
  - ➢ Principles & GL for the conduct of microbiological risk management;
  - ➢ Principles for risk analysis of foods derived from modern biotechnology
- **HACCP** - Recommended international Code of Practice – General principles of food hygiene & Annex on HACCP systems & GL for its application
- **Emergency situation** - Principles & GL for exchange of information in food safety emergency situations (CAC/GL 19–2004)
- **Inspection & certification** – principles(CAC/GL 20-1995) ; GL for design, operation, assessment & accreditation of food import & export inspection & certification systems (CAC/GL 26 1997)

Influences on food safety



Bangkok Post 26 Jan 2011

- Increase in pesticide use by Thai farmers
- Suggested DoA needs to impose complete ban on carbofuran/dicrotophos/methomyl/EPN
- Thailand imports of pesticides rose from 42,089 tonnes in 1997 to 137,594 tonnes in 2009.
- EU found prohibited chemicals in imported vegetables (basil, chili, Chinese bitter cucumber & bean)
- Fears of a possible EU ban prompted govt to temporary suspend shipments.

"We were warned about chemical-contaminated vegetables 26 times in 2009 & up to 55 times last year," said a member of the Thailand Pesticide Network

E. coli (O104:H4)

Gaurdian 2 June 2011 :E coli outbreak: Russia widens EU vegetable ban - Russia has extended its ban on vegetable imports to all of the EU in a bid to prevent a deadly European bacterial outbreak from spreading into the country. Researchers are still unable to pinpoint the cause of the *E coli* outbreak that has hit Germany & other European countries, infecting 1,500 people & leaving 17 dead.

Sprouts from imported fenugreek seeds caused bloody diarrhea & serious complications

A farmer destroys iceberg lettuce on a field in Germany, where most of the *E. coli* cases have occurred

Hepatitis A in semi-dried tomatoes

- National food incident in Australia triggered in May '09
- 420 cases – March 2009 to March 2010
- Epidemiological link with imported semidried tomatoes processed in Australia
- Tracing back investigation indicated frozen tomatoes imported tested positive for hepatitis A virus (HAV)

Major Food Safety Concerns

- Residues & contaminants
- Pathogens & spoilage micro-organisms
- Plant/ animal pests & diseases
- Technology issues
- Physical contaminants
- Persistent organic pollutants
- Food allergens
- Labeling & claims

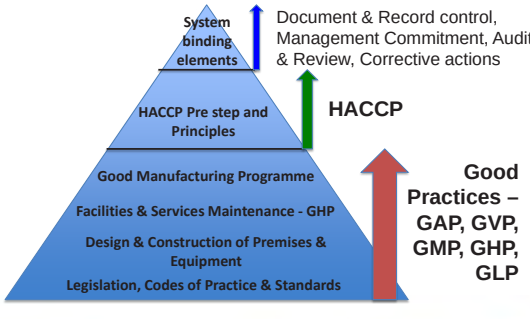
The food chain approach

- Arise at different stages
- A preventative approach based on risk
- Roles & responsibilities for food safety
- Sound national food control & regulatory systems essential

Preventative Approach based on Risk – in Food Chain

- **Good Practices**
  - GMP/GHP – ensure safety & suitability of food
  - GAP – ensures safe & quality produce
- **HACCP**
  - identifies, evaluates & controls hazards significant for food safety
  - method to reduce & manage risk
- **FSMS** – manage food safety in food business (includes GHPs; HACCP; management systems elements & policies; & traceability system)

Preventative approach for food safety include?



Who Shall be Responsible?

The Farmer - implementing GAP

The Processor
- production of safe food
- proactive dialogue with regulatory bodies
- Up-grade facility, design system, implement it

Handlers (transporters, storage…)
- Maintaining appropriate conditions

The Government
- enabling environment (scientific, technical, financial, infrastructure, regulatory) favorable to compliance by stakeholders

The Consumer
- demanding safe product;
- following directions for storage & use

Effective food control include

- Sound national food control & regulatory systems
- Standards & Conformity Assessment
- The basic components of food control system to ensure food safety in Fruits & Vegetables include:
  - ➢Legislative framework
  - ➢Controls & procedures
  - ➢Facilities & equipment, laboratories
  - ➢Transportation & communication
  - ➢Personnel & training

FOOD SAFETY

assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use

Good Agricultural Practices (GAP)

Focus at two levels

- Farm level
- Pack House

Good Agricultural Practices (GAP)

Focus at farm on

- –Environment Hygiene
- –Hygienic Production
- –Handling Storage & Transportation
- –Cleaning Maintenance & Personal Hygiene

Good Agricultural Practices (GAP)

Focus at Pack House on

- –Design of Pack House
- –Control of Operations
- –Maintenance & Sanitation
- –Personal Hygiene
- –Transportation
- –Product Information
- –Training

Questions and Doubts

Session 3

GAP Standards – Global and ASEAN Regional Scenario

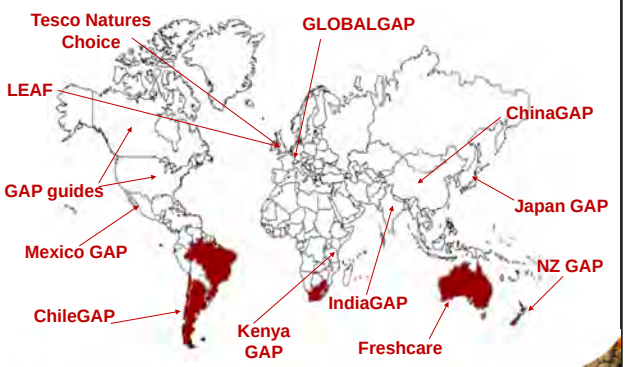
Purpose of module

- To introduce various GAP standards at global level
- To obtain a brief understanding of GlobalGAP
- To obtain get an overview of status of various GAP standards in the ASEAN region – national and regional

Contents of the module

- GAPs standards worldwide
- Overview of GlobalGAP
- National GAP in various ASEAN countries

GAP in the world



GAP – Global Scenario

- In many countries Public authority and/or the Private sector have developed their own set of GAP standards
- These are developed for export market & are used for domestic buyers as well
- In some countries these are voluntary standards & in others mandatory (Thailand)
- Compliance to GAP is verified by Certification Process

GlobalGAP

- Initially known as EurepGAP started in late 1990s as a private sector standard with focus primarily on pesticide residues
- Developed by European supermarket chains and their major suppliers
- In September 2007 changed name from EurepGAP to GlobalGAP
- In 2008, 92000 farmers in 88 countries certified to GlobalGAP
- In April 2010, there were 102,267 producers certified to GlobalGAP
- Currently 123,000 producers (111 countries) certified

Recorded Success story

GLOBALG.A.P. SUCCESS STORY

Bigger market chances for small-scale farmers

In alliance with a number of renowned organisations and partners GLOBALGAP is aiming to facilitate market-access for smallholders worldwide. First market impacts are already visible in Thailand.

THE PROCESS

Four Option 2 farmer groups including 70 farmers with a total area of 160 hectares have already been formed. The groups are trained in quality management and audit inspections, harvesting and produce handling, pesticide and fertiliser requirements, storage facilities, standard requirements and environmental issues.

The aim is for all of the four groups and 70 farmers to be certified at the end of the project. The associations involved hope to continue the project in the future to make it possible for as many Thai farmers as possible to take part.

Indonesia

- There are three levels of certification-
  - Prima One for produce that is safe for consumption, good in quality and produced with environmentally friendly processes of technologies,
  - Prima Two for produce that is safe for consumption and good in quality, and
  - Prima Three for produce that is safe for consumption.

Philippines

- The program for GAP for FV Farming was launched in 2006.
- The objectives was to increase market access in both local and foreign markets, empower farmers to respond to consumer demand for food safety and quality, and facilitate adoption of sustainable practices.

Philippines

- The program has six components –
  - farm location,
  - farm structure,
  - farm environment,
  - farm maintenance,
  - farm practices and
  - farm management.

Thailand

- Q GAP Program launched in 2003
- Purpose – ensure food crops produced are safe, wholesome and meet the required standards
- Q GAP has initially three levels-production processes for
  (1)safe products,
  (2)safe and pest-free products, and
  (3)safe, pest-free and quality products.

Thailand

- Thai Department of Agriculture has developed 28 crop manuals detailing practices required to improve yield, quality and food safety.
- Topics included varieties, cultivation, fertilizing, irrigation, crop sanitation, crop protection, safe pesticide use, harvesting, transportation and record keeping.

Thailand

- The Q GAP Mark is promoted to supply chain customers and to customers to provide confidence that produce grown by certified farms is safe to eat.

Thailand

- Agricultural Standards Act, 2008 – legal framework in which standards for farm produces will be established, certified and controlled.
- Initially, implementation voluntarily
- Mandatory standards will be implemented on food safety and its public concerns

Thailand

- Accreditation and certification for agricultural standards regulated by Agricultural Standards Act 2008
- Q GAP program implementing before the enactment of this law shall be transited thereto and enforced by this law.

Vietnam

The Department of Science and Technology (DST) and the Vietnamese Academy of Agricultural Sciences (VAAS) were nominated to develop a national GAP system for Vietnam.

Vietnam

- VietGAP released on 28th January 2008 - the Ministry of Agriculture and Rural Development to drive its development
- VietGAP based on ASEANGAP and designed to meet specific needs of Vietnamese fresh fruit and vegetables industry

Vietnam

VietGAP consists of 12 sections

- Site assessment and selection,
- Planting material,
- Soil and substrates,
- Fertilizers and soil additives,
- Water, Chemicals,
- Harvesting and handling produce,
- Waste management and treatment,
- Workers and training,
- Documents,
- records,
- traceability and recall,
- Internal audit and Complaint handling

Other ASEAN countries

National GAP standards of other ASEAN countries at various stages

- Laos PDR is developing based on the ASEANGAP
- Brunei Darussalam
- Myanmar
- Cambodia

Questions and Doubts

Annex 5 Training slides on Relation between quality, safety and GAP

Session 4

Relation between Quality, Safety & GAP,

Purpose of module

- To introduce the concept of “Quality” and “Safety” in food (fruits and vegetables)
- To differentiate between the quality and safety parameters in fruits and vegetables
- To understand the relation between quality, food safety and GAP

Contents of the module

- Quality and safety concepts
- Factors affecting quality and food safety in fruits and vegetables
- Relation between quality, food safety and GAP

Quality is not a matter of chance …….

It’s a matter of choice

What is Quality in food….?

Food Quality

Quality is defined as a totality of characteristics of a product that bears on its ability to satisfy stated or implied needs.

It is subjective and means different things to different people. This includes

- Nutritive value – vitamin, protein, fat content
- Sensory properties – taste, smell
- Appearance – colour, size, firmness, blemishes
- Convenience – easy to peel, shelf life
- Food safety – Pesticide residues, pathogens

Expression of Quality

- **Stated needs or parameters**
- **Implied needs or parameters**

FOOD SAFETY – Which parameter?

FOOD SAFETY

assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use

Identify the food safety issues….

- Size and shape of fruits and vegetables
- Taste & fragrance of fruits & vegetables
- Shelf life of fruits and vegetables
- Packaging material in which packed
- Pesticide residue
- Nutritive content in fruits & vegetables
- Presence of salmonella or E coli
- Design and colour of the label and logo

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Factors affecting both Q & FS

- Seed quality and selection
- Soil quality
- Crop management – spacing, weeding
- Water – quantity, quality, technique
- Fertilization – selection, concentration, use
- Diseases & pests – pesticide residue
- Post harvest handling – maturity stage, harvesting technique
- Transport – type, packaging quality, temperature
- Storage – condition, length

Good Agricultural Practices

- The food chain approach recognises that hazards can arise at various stages of the food chain (production, harvesting, post-harvest operations, processing, packaging, transportation, storage and retailing) and need to be prevented or eliminated at each stage.
- GAP are practices that when applied on farms during pre production, production, harvest and post harvest ensure safety and quality of food
- In many cases such practices also help to protect the environment and safety of workers

Quality, Food Safety & GAP

INTERRELATED

Questions and Doubts