Good Agricultural Practices (GAP) for Crop Production

Introduction

Good Agricultural Practices GAP) is a key element in quality assurance chain and that it, along with Good Manufacturing Practices (GMP), Hazard Analysis and the Critical Points (HACCP), contributes to ensuring food safety. GAP guidelines are designed to encourage growers of crops such as fruits and vegetables to learn more about what it takes to have a food safety management plan to protect your business.

This article gives you an overview on the basics needed to plan, execute and document good agricultural practices in the farm that will ultimately provide the public with a safe and nutritious product in a manner that sustains agricultural productivity. It is also written to help conscientious growers examine and improve production practices to ensure they are generally accepted standards of good agricultural practices. Generally speaking, there are seven key elements to good agricultural practices for crop production as listed in the **Malaysian Standard Crop Commodity – Good Agricultural Practices** (MS 1784:2005):

1. Traceability and record keeping

A written plan is key to maintaining any GAP program and it should cover all aspects of production. Traceback is the ability to track the produce back to its source. Traceforward is the ability to identify all receivers of the produce from a given source. Both are necessary to identify the potential source of a problem and to implement a recall. The produce is packed and labeled indicating the type of produce, name and address of a grower (Fig. 1).

Fig. 1. Commercial pakages of rambutan anak sekolah

From a public health perspective, the speed and accuracy of tracing implicated food items back to their source and forward to all receivers helps to limit the population at risk in an outbreak. This time factor also reduces the accompanying publicity and reduces consumer anxiety. It is critical that growers establish tracking systems from the earliest stages of growing. Current federal regulations for food processors require one step forward and one step back traceability within the distribution system. This includes those involved in packing, storing, and transporting fruits and vegetables.

Components of a written GAPs plan, include, but are not limited to:

- identification of land ownership and prior use
- a crop production flow chart
- maps of farming operations, including location of water source, septic systems or other waste water systems, residences on property, important elements of adjacent property that could potentially lead to contamination of the farm
- record of worker training programs
- record of water and produce testings
- composting records

- records of application for all inputs such as fertilizers, soil amendments and pest management
- record of the workers\' particulars

2. Planting Materials

Choosing a crop is as important as selecting a farm site where to grow it. All crops need fertile and well-drained soil. However, produce variety should meet the requirement agreed between the producer and the potential customer with respect of quality standards (taste, visual appearance, shelf life, agronomic performance and minimum dependence on agrochemicals). The use of genetically modified planting materials shall be avoided unless expressed permission has been given by the relevant authorities and should comply with the existing regulations in the country of the end users.

Growers should be aware of the variety\'s degree of susceptibility to pests and diseases and have reasons for using the selected variety. Wherever possible, varieties should possess resistance/tolerance to important pests and diseases. This results in minimum usage of chemical insecticides and fungicides for pests and diseases management.

3. Pesticides and Their Use

Malaysia has pesticide regulations established to ensure the safe use of pesticides and to ensure that fruits and vegetables are marketed only when pesticide residues meet the regulatory standards. All pesticides must be registered with Malaysian Pesticide Board. Details on GAPs related to the use of pesticides will be published in the next article.

4. Employee Hygiene and Training

Any individual in contact with fruit or any food product can potentially serve as a means to spread food borne pathogens. Proper worker hygiene is critical. The workers must be trained in good hygiene and document the frequency and content of training meetings. This training should include:

- proper use of toilet and hand-washing facilities
- Specific training in thorough hand-washing techniques
- Proper storage of gloves and equipment while using facilities (Fig. 2)
- Food consumption only at perimeter of the farm
- Proper trash/waste disposal
- Policy that workers who display any symptoms of food borne illness, such as diarrhea or vomiting should not be allowed to handle product. Also, that any open sores, wounds or boils be covered properly before handling fruits

Put-on safety gears *The right way to use power tiller*

Fig. 2. On-the-job training for workers

Under OSHA requirements, the employer must provide hand-washing facilities for workers that meet the following:

- potable (drinking water quality) water is available for hand washing
- Hand-washing facilities refilled with potable water as soon as often as necessary to ensure adequate supply
- Soap or other suitable cleansing agent and single-use towels are provided
- Signs posted indicating that water is only for hand washing purposes
- A minimum of one hand-washing facility be maintained for every 20 employees
- Wash and rinse water is contained and disposed of after use, and not allowed to flow onto the ground.

5. Field Sanitation & Harvest Practices

General sanitation of the farm, bins, baskets and equipment is necessary to prevent contamination of food product with human pathogens. The basic rule is to start with clean equipment. Contaminated hand tools, gloves, clothing or picking baskets transfer pathogens to fruits or vegetables. The first and most important rule is that fruit that drops or is on the ground must not go into basket for human consumption. Similarly, fresh-cut vegetables must not put on the ground before transporting them to the collecting centre (Fig. 3). It is imperative that pickers understand this rule at the outset. Fruits and vegetables on the ground are subjected to decay as well as potential contamination from the ground.

Do not put vegetables on the ground *Fresh cut vegetables put inside basket*

Fig. 3. Put fresh-cut vegetables in basket

Toilet facilities must be provided for the workers and be maintained in clean condition (Fig. 4). Keep on file documentation for the maintenance of toilet and hand-washing facilities and servicing. Keep them well supplied with toilet paper, soap and paper towels and provide a trash container for used hand towels.

Fig. . 4 Clean toilet

Fig. 5 Safety gears kept dry and clean

Harvesting equipment such as gloves, hand tools and picking baskets should be as clean as practicable and free of contamination (Fig. 5). Document procedures and schedules for

cleaning and sanitizing such equipment used in the field. Baskets should be used only for the purpose of holding and transporting fruits or vegetables.

6. Water

Water used in production of fruits or vegetables may be the source of heavy metal, pesticide residue and biological contamination of fruits intended for human consumption. This includes water used for irrigation, mixing foliar sprays, as well as for cleaning hands and farm equipment. Water sources, such as river, reservoirs, ponds or surface basins, must be protected from contamination from dumping, run-off, or leaching of pesticide residue and microbiological contaminants from adjacent land, whether farmland or other land use(Fig. 6).

Fig. 6. Pond water for irrigation

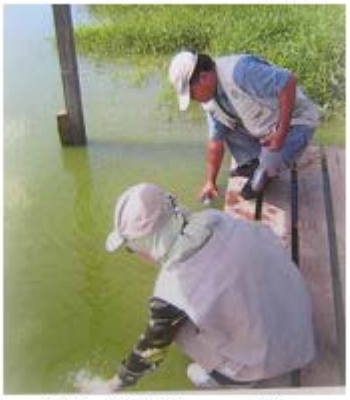

Fig. 7. Water sampling

Each grower should commit to at least monthly sampling of water sources for one season (three months) to establish a baseline of expected water quality values. Following development of the baseline, growers should test routinely (at least once a year) to monitor the presence of heavy metals and pesticide residues in water (Fig. 7).

7. Soil amendments and manuring

Growers must know their land, its soil types and its drainage capabilities. Document the soil types, production history, previous and adjacent land uses, and keep records of soil testing, pesticide used, fertilizer application and soil amendments in order to identify potential heavy metals, pesticide residue and microbiological risks. Care in sourcing, treating and applying manure is essential to any effective food safety program.

The application of fertilizer should be based on the nutrient levels of the soil or substrates and requirements of the crop. The types, quantity, method, timing and frequency of fertilizer application should be carefully observed so as to maximise benefits and minmise losses. Organic fertilizer such as properly composted crop residues and manure is safer than fresh or aged manure (Fig. 8). Malaysian Organic Scheme (SOM) for composting are regulated by Department of Agriculture. The use of untreated or treated human sewage and pig waste are prohibited.

Compost bins for crop residues *Crop residue compost ready for use*

Fig. 8. Making compost from crop residues

DOA GAP Programs

The DOA GAP guidelines and principles mentioned above are based upon the Malaysian Standards Crop CROP Commodities – Good Agricultural Practice (MS 1784:2005) and Malaysia Farm Certification Scheme for Good Agricultural Practice (SALM).

Article contributed by Kadin Empari - email: kadine@sarawaknet.gov.my