INTRODUCTION OF GOOD AGRICULTURAL PRACTICE (GAP) IN KOREA

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ABSTRACT

Aiming for a full-scale implementation of Good Agricultural Practice (GAP) in 2006, Korea is currently conducting a GAP trial program. Korea has established a long-term plan for the period leading up to 2013 to introduce a GAP program that corresponds with international standards such as Codex and EurepGAP. The Korean GAP cultivation protocols consist of 170 mandatory and autonomous elements, and based on the trial program, the protocols will be modified according to agricultural circumstances in Korea. Although there have been problems such as lack of understanding from the farming households, insufficient training and promotion, and integration of similar certification programs which surfaced during the trial program, most of the problems have been resolved without much difficulty, and the GAP program is expected to take off in 2006.

Key words: GAP, traceability, cultivation protocol, information system

INTRODUCTION

Due to incidents such as the mad-cow disease (BSE or bovine spongiform encephalopathy) crisis and detection of agrochemical residues in fruits and vegetables, organizations such as Codex have been involved in discussions on setting international food safety standards since the mid-1990s. In order to produce safe and nutritious fruits and vegetables, the European Union (EU) has developed good agricultural practices (GAPs) and is trying to make EurepGAP an international certification standard. The United States and Canada have introduced and implemented the GAP program for securing the safety of domestic and imported agricultural products.

In line with such international movements, the requirement for consumer agricultural products have increased in Korea, calling for the introduction of GAP as a safety and health management system. Securing the quality and safety of agricultural products is an essential element for nurturing environment-friendly farming practices such as preventing environmental pollution. With an increasing national income, there has been a constantly increasing consumer demand for safe agricultural products. Moreover, in order to protect the natural environment and sustain agricultural activities, low-input sustainable agricultural techniques and GAPs have been introduced in Korea.

THE GAP CONCEPT IN KOREA

The concept of GAP in Korea involves “regulations for eliminating harmful elements in the production and processing stages for the producers and supervisors so that safe and healthy agricultural and livestock products can be supplied to the consumers.” This involves minimizing harmful effects on the environment; implementing a system for managing the levels of chemicals, heavy metals and microbes during cultivation, harvesting and postharvest processes; informing consumers; and delivering safe food products to the market. The GAP program in Korea aims to provide producers with regulations on cultivating safe agricultural products and implement a traceability system to clarify the responsibilities of producers at each stage of production and postproduction to secure the trust of consumers.
Comparing GAP and Other Policies

In addition to GAP are two other agricultural product quality certifications in Korea: Eco-Friendly Agri-Products and Agricultural Product Quality Certification. Table 1 shows the comparison between these two regulations.

Table 1. Comparison of GAP and other quality certifications in Korea

<table>
<thead>
<tr>
<th>Category</th>
<th>GAP</th>
<th>Quality Certification</th>
<th>Eco-Friendly Agri-Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal basis</td>
<td>Agricultural Products Quality Control Act</td>
<td>Agricultural Products Quality Control Act</td>
<td>Environment-Friendly Agricultural Development Act</td>
</tr>
<tr>
<td>Subjects</td>
<td>Agricultural products with GAP cultivation protocol standards</td>
<td>Agricultural products from renowned places or with distinguishing characteristics that meet or exceed the “premium” standard</td>
<td>Organic, transitional organic, non-chemical, minimum-chemical agricultural products</td>
</tr>
<tr>
<td>Administrator</td>
<td>Mark: producer association, distributor</td>
<td>National Agricultural Products Quality Management Service (NAQS)</td>
<td>National Agricultural Products Quality Management Service (NAQS)</td>
</tr>
<tr>
<td>Major Objectives</td>
<td>Securing safety</td>
<td>Enhancing quality of agricultural products</td>
<td>Environment preservation</td>
</tr>
<tr>
<td></td>
<td>Environment-friendly agriculture</td>
<td></td>
<td>Safety and economic feasibility of agricultural products</td>
</tr>
<tr>
<td></td>
<td>Providing information to consumers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristics</td>
<td>Applies GAP cultivation protocol (indicates traceability)</td>
<td>Reputation + uniqueness</td>
<td>Usage of environment-friendly materials and agricultural techniques</td>
</tr>
<tr>
<td></td>
<td>Key objective is securing safety</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard agricultural method</th>
<th>○</th>
<th>-</th>
<th>○</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Product standards</td>
<td>-</td>
<td>○</td>
<td>-</td>
</tr>
<tr>
<td>Traceability</td>
<td>○</td>
<td>-</td>
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</tr>
</tbody>
</table>
processes are reviewed; the certification status is notified; and the production and shipping processes are surveyed.

Eco-friendly agri-products. Agricultural products that use little or no fertilizer or agrochemicals are classified and certified according to the usage level as organic agricultural products, transitional organic agricultural products, non-chemical agricultural products and minimum-chemical agricultural products. Livestock products are classified as organic livestock products and transitional livestock products.

The Introduction Process of GAP

In order to produce high-quality agricultural products that can be internationally acknowledged, Korea decided to introduce the GAP program in September 2002 and initiated the process for medicinal crops. As the Food and Agriculture Organization (FAO) and Codex (International Food Standards Committee) announced in April and June 2003, respectively, that they would establish the GAP standards, Korea decided to expand the GAP program to include all cultivated produce, and the project is now well under way.

Accordingly, the Ministry of Agriculture and Forestry (MAF) carried out the initial tasks of studying GAP-related policies of developed nations and preparing drafts for legal measures. In 2004, a trial service was conducted for about 350 farming households. The trial service will be expanded to include about 950 households in 2005. A full-fledged program is expected to begin in 2006. In order to successfully introduce the GAP program, a task force that consisted of representatives from six organizations – MAF, Rural Development Administration (RDA), National Agricultural Products Quality Management Service (NAQS), NACF (National Agricultural Cooperation Federation) and KATC (Korea Agro-Trade Corporation) – was formed in February 2003 to prepare regulatory measures and carry out trial programs.

In 2003, the MAF designed the GAP logo and released a GAP Handbook, consisting of protocols and related materials from other countries. In order to prepare a GAP cultivation protocol for each product according to international standards, the task force devised guidelines by referring to Codex regulations on maintaining freshness and healthy conditions for fruits and vegetables, according to the circumstances in Korea. The protocols cover areas related to agricultural product safety issues such as environmental hygiene, soil, irrigation, agrochemicals and fertilizers.

The implementation process for the GAP program can be summarized as follows:

1) The GAP Handbook was released and the GAP certification logo was designed (MAF et al. February – December 2003).

2) The GAP Handbook, based on GAP guidelines from Codex, FAO, EU and the US, was written and distributed to related organizations (MAF, RDA, NAQS, NACF, etc.). The GAP certification logo (Fig. 1) was chosen through a public contest and the winning logo was registered as a trademark.

3) The production stage record guidelines for introducing the traceability system was prepared (November 2003) and the records and display standards required for the GAP trial program in 2004 were determined.

4) The Agricultural Products Quality Control Act, to be modified in 2004-2005, was enacted. The law provides the legal basis for GAP, introducing it as a certification policy to distinguish certified products from general goods.

5) The GAP cultivation protocols and support for hygienic facilities were established. In 2003, the cultivation protocols for 67 products were supplemented and the protocols for 15 items, including special application crops, were added. In 2004, the cultivation protocols for 82 products were written and protocols for 96 additional items were scheduled to be added by 2005.

6) The GAP training system was implemented. A GAP expert from the American Food and Drug Administration
(FDA) was invited to conduct training sessions for 50 GAP-related personnel. Training systems for participating farmers and maintenance staff (distributors and processors) were developed. An on-site training system, administered by the provincial Agricultural Research and Extension Service (ARES), City Agricultural Development and Technology (CADT), NACF and KATC, was established. On GAP expert training, training programs for developing instructors and the certification personnel, administered by the Korea National Agricultural College (KNAC), were established.

7) GAP policy and agricultural products from trial programs were promoted by holding GAP introductory and promotional sessions for producers, consumers, distributors and local authorities as well as seminars on the objectives and development direction of GAP; and seeking promotional and marketing channels for GAP products through promotional events.

Table 2 describes the action plans classified into initial, mid- and long-term plans.

1) Initial plan (2003-2005)
- Encouraging GAP participation for quality certification and environment-friendly-certified farm households (slightest amount of chemical use and crops without chemicals)
- Developing and finding private parties intending to participate as GAP-certified organizations
- Intensifying the guidance and supervision of certification agencies for task performance and manual writing

2) Mid-term Plan (2006-2008)
- Preparing GAP protocols according to international standards and improving policies
- Expanding the development and designation of GAP expert certification agencies
- Creating complexes for expanding GAP
- Developing a traceability system from the production to sales stages
- Intensifying postharvest management for GAP agricultural products
- Promoting the GAP program nationwide

3) Long-term Plan (2009-2013)
- Implementing an international-standard GAP program
- Expanding GAP expert certification agencies (more than 30 agencies)
- Developing GAP experts through GAP training facilities (1,500 experts)
- Intensifying the management for enhancing the reliability of GAP agricultural products

If these plans are carried out according to schedule, GAP agricultural products will account for more than 10% of the overall produce, implementing an agricultural product management system that allows consumers to purchase safe products and enabling GAP to incorporate existing policies such as quality certification, non-chemical certification, minimum-chemical certification and environment-friendly certification in Korea.

**CULTIVATION PROTOCOLS FOR GAP**

In order to obtain GAP certification, producers must follow a strict production environment management and constant quality management
according to the cultivation protocols (MAF 2005). The farm management protocol consists of 97 mandatory items that must be adhered to by the producer and the supervisor and 73 recommendations that can be followed autonomously. These items are scheduled to be modified according to the results of trial programs in 2004–2005. Rather than general cultivation methods, the cultivation protocols focus on issues that can secure the safety of agricultural products in all processes such as production environment, cultivation techniques, introduction of agricultural materials, postharvest management, shipping and distribution. The major issues are as follows:

1) Implementation of traceability
It is essential to maintain all records throughout, from production to primary and secondary processing and distribution, to identify causes and provide prompt measures when problems arise. In the Agricultural Products Quality Control Act, the concept of traceability is defined as the “management from the production to the sales stages to enable tracing of a particular agricultural product.”

2) Selection of species
Although selection of the species is at the producer’s discretion, the quality standards (taste, outward appearance, storage, economic feasibility, effect on the environment and the minimal level of agrochemicals introduced) must correspond with requirements from the farmers and the consumers.

3) Production environment management
Products with levels of harmful substances and effective nutrient greater than those specified in the Soil Environment Protection Act will not be GAP-certified so that the soil can be effectively managed.

4) Nutrient management and fertilizer use
The principle outlined in GAP is the application of integrated nutrient management (INM).

5) Water management and irrigation
There must be efficient water management according to the state of soil, management, cultivation and pasture to prevent soil erosion.

6) Crop protection
One of the fundamentals of GAP is integrated pest management (IPM).

7) Agrochemical management
The basic rule in using agrochemicals is to comply with the safety usage standards, which specify restrictions on the number of sprays and final spray intervals (the number of days) prior to harvesting for each crop so that the chemical residues do not exceed the allowed level.

8) Postharvest management
Things that are required for postharvest management include water, transportation vehicle, facilities and minimum chemical processing.

9) Storage of agricultural products
Agricultural products must be stored and maintained to secure their safety. Storage management standards must be established (with the criteria below) and specified, and the information must be recorded and managed.
- name, quantity and standards for materials and equipment at the time of purchase.
- storage location and method
- management of agricultural products being shipped in and out of storage
- procedures for processing defective goods
- measures for preventing cross-contamination during handling

10) Waste and harmful material management
Wastes should be recycled to avoid landfills and incineration. Farm waste should be maintained with special attention and the storage facilities must be kept clean.

11) Workers’ health, safety and welfare issues
The action plan must be developed to allow those involved in the production stages to work in healthy and safe environments.

12) Environmental issues
It is important to convert to low-input sustained agricultural technique to minimize the effects on nature and secure bases for sustainable agricultural activities.
13) Training
Training on production activities such as cultivation, harvesting and packaging for producers is essential, and the level of training must be evaluated.

MODEL PROJECT ON GAP

GAP mainly deals with sanitation management up to the point of shipment, including soil and water quality management prior to sowing of seeds, species management (genetically modified organisms, etc.), and food safety management (agrochemicals, heavy metals, microbes, etc.) during cultivation. Needless to say, maintaining records for traceability is essential for such purposes. The certification process involves the participation of producer organizations such as the NACF as well as local governments. A system for safely producing agricultural goods must be implemented in a timely manner by preparing standards for contract cultivation and internal quality management. Furthermore, with the local governments in charge, inspections and certification management must be conducted for GAP programs offered by producer organizations and the NACF. The National Agricultural Products Quality Management Service (NAQS) shall be responsible for technical guidance and supervision of organizations such as certification agencies.

Table 3 shows the farming households participating in the trial program in 2005.

Action Plan

1) GAP training
Training shall be provided for the GAP trial program administrator, participating households and agricultural product maintenance facility supervisors. There will be two training sessions for ten hours (MAF 2005).

2) Soil and water quality test
Soil, water and processing water required for GAP facilities shall be sampled and tested.

3) Production management
There shall be guidance and supervision of the production processes to allow compliance with the GAP management standards.

4) Safety inspection for harvested agricultural products
Usage of agrochemicals for crops sold in Korea must comply with the Agrochemicals Control Act. For general agricultural products, tests shall be conducted for residues of agrochemicals. For medicinal crops, additional tests will be required for heavy metals.

5) GAP agricultural product maintenance facility and management standards
Inspections on facility and quality management, processing and packaging, storage management, sterilization and transportation for producing high-quality agricultural products shall be conducted according to the task checklist.

6) GAP hygiene management
Hygiene management for tools, storage and transportation facilities operated by producers and supervisors shall be strictly enforced.

7) GAP certification management
Certification shall be provided for the agricultural products that comply with 93 mandatory items of the GAP standards. The certified agricultural products can be marked according to the marking specifications, classified into mandatory and optional display items.

8) Traceability
Traceability from the production to the sales stages shall be implemented according to the traceability guidelines. The records shall be maintained for at

<table>
<thead>
<tr>
<th>Administrator</th>
<th>No. of households</th>
<th>Items</th>
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<tbody>
<tr>
<td>Six organizations including NACF</td>
<td>965</td>
<td>47 items including rice, icicle radish, lettuce, tangerine, grape, apple, ginseng, pear</td>
</tr>
</tbody>
</table>
least one year and made available at processing and sales sites.  
9) GAP compliance
   NAQS shall examine the production and shipment of agricultural products and may perform inspections for the products displayed for sales purposes.

GAP AWARENESS

Farmers

According to a survey report released by KREI (Park 2004), price and quality were the first and second, respectively, as the most important considerations of farming households when producing and marketing agricultural products. The third most important factor was safety of products. A significant number of producers were not aware of the GAP logo, indicating that the program has not been sufficiently promoted. Among the elements that GAP regards as safety issues, producer training and consultation was 59.3%; chemical remnant and heavy metals testing, 23.6%; and chemical and fertilizer management during cultivation, 22.5%.

Retailers

About 51.0% of the agricultural products handled by the distributors had safety certifications. Of the respondents, 81.8% said that they planned to purchase products with safety certifications. A survey report on distributors' GAP recognition conducted by KREI (Lee et al. 2004) revealed that 25% of major distribution chains and 58% of small and medium distributors were not aware of the accurate concept of GAP, indicating the need for constant promotion and training efforts. The major distribution chains said that they would like to introduce GAP for fruits, followed by vegetables, displaying a high level of interest in the safe usage of agrochemicals and fertilizers.

According to the distributors, in addition to environment-friendly agricultural products, each of the GAP and traceable products is expected to account for 10% of the goods handled. Moreover, they stressed that the adequate establishment of related standards and preparation of manuals should be the focus in order to effectively introduce GAP. On the other hand, 68% of the distributors indicated their intention to participate in internal quality certification programs, displaying a high level of interest in self quality control.

Consumers

Of the consumers surveyed, 87.7% said that they were not aware of GAP, indicating a need for stronger promotional efforts, and 61.8% said that they were willing to pay extra to purchase GAP agricultural products, with Seoul residents indicating a higher degree of intention. Among the important factors in the GAP program were hygiene management at production facilities and prevention of contamination, 28.0%; agrochemical and fertilizer management during cultivation, 18.3%; and 18.3% testing of chemical remnants and heavy metals, 18.3%.

PROBLEMS ENCOUNTERED DURING THE TRIAL PROGRAM AND IMPROVEMENT MEASURES

1) The level of consumer awareness on GAP is low and there is insufficient willingness of the farming households to participate because the amount of GAP production is insignificant inasmuch as the level of awareness from distributors and consumers is low and there are no incentives.
2) As a precondition for applying for GAP, the applicant must have completed related training sessions and soil/water quality tests. Since soil and water quality tests require a substantial amount of time, the tests should be completed prior to the application process and the applicant should submit certificates for the test results.
3) Some agrochemical usage guidelines are not clear. For medicinal crops, there are no chemicals registered in the Agrochemical Control Act, making it impossible to implement GAP.
4) There have been insufficient promotional efforts for encouraging the consumption of GAP agricultural products. Although GAP agricultural products are priced somewhat higher than general products, active promotional efforts are required for stable pricing.
5) There are insufficient systems for GAP training. Providing training to develop GAP experts is urgent. The trainees, in turn, must be able to train the farming households and government employees. The program should be developed with a focus on postharvest management rather than production stages. Moreover, GAP training should be expanded to private institutions so that those involved in agriculture can receive training without difficulty.

6) The GAP cultivation protocols and certification standards should be revised. The 170 items must reflect current circumstances in Korea and be improved to approach the international standards such as Codex.

7) There are insufficient outstanding Agricultural Product Processing Centers (APCs) for expanding the GAP program. Since the produce must be maintained in a hygienic facility after harvest in order to acquire GAP certification, the existing facilities such as APCs must be improved.

8) Similar certification policies must be integrated with GAP, adjusted and improved.

CONCLUSION

With the prospect of introducing GAP in 2006, the Korean government is administering trial programs between 2003 and 2005. Rules and regulations related to GAP are currently being revised. Moreover, organizations are being selected and developed for GAP expert certification agencies, and training and promotional activities are being conducted for producers, consumers and distributors.

Some problems that surfaced during trial programs need to be dealt with for introducing and developing the GAP program. The problems and their measures can be summarized as follows:

First, the GAP safety production and hygiene management standards should be modified according to international standards as well as agricultural circumstances in Korea. Therefore, seminars on the GAP policy, designation of certification agencies and registration procedures should be held for the academia, environment-friendly certification organizations, food manufacturers and distributors.

Second, training programs should be developed for nurturing GAP certification experts. Moreover, budget must be allocated so that funding can be provided for GAP certification agencies and allow them to be more self-sufficient.

Third, in order to expedite the stabilization process for GAP, producer organizations such as cultivation associations and facilities such as RPC and APC should be designated as key leaders for taking the initiative to lead the GAP program.

Fourth, surveys in collaboration with related organizations should be conducted for trial agricultural products to enhance the reliability of GAP products.

If these issues can be implemented in a comprehensive manner, the GAP program in Korea shall start according to schedule in 2006.

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