Future directions for postharvest research

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THE background and constraints to be considered when discussing postharvest research were presented mainly by keynote speakers Drs Mrema and Poulter, and some speakers at Session 1 such as Drs Ferris and Ospina, and are summarized in Table 1. Developing regions/countries are suffering from high postharvest losses of agricultural products, oversupply of primary products, importation of goods that can be produced domestically, poor marketing systems, and an increased income gap between the rural and the urban populations under globalization and liberalization of trade and urbanization of local society. Consumers have become increasingly concerned about the safety of foods and the effects of diets on health—both in developing countries and developed ones. The recent development of biotechnology and information technology influences lifestyle, postharvest-related technologies, and marketing systems.

Table 1. Background and major constraints.

• Globalization
• Trade liberalization
• Urbanization
• Development of biotechnology
• Concerns about safety and health
• Importance of sustainability
• Development of information technology
• Increased income gap between rural and urban populations
• High postharvest losses
• Oversupply of primary products
• Importation of goods that can be produced domestically
• Poor marketing systems
• Weak research and development capacity
• Poor on-farm processing
• Inadequate policies, infrastructure and information exchange

Safety and quality are the major interests of consumers, and safe and high-quality foods will increase market opportunities. On the contrary, products that do not satisfy consumers in terms of safety will lose their market. One example of this is the pesticide contamination of Chinese vegetables imported into Japan. In summer 2002, the Japanese mass media released news that Chinese vegetables were contaminated with pesticide residues at higher levels than permissible by the relevant standards, and most Japanese supermarkets and retailers got rid of such Chinese vegetables. As a result, the vegetables that had been produced for the Japanese market (but not those for the domestic ones) lost their market. The Chinese Government had already prepared systems to ensure the safety of agricultural products and foods under the Green Food, Organic Food and Pollution-free Food Promotion Program, but they had not functioned satisfactorily. Agricultural products and foods should be produced and

distributed under conditions that meet international standards and requirements, such as Codex, Hazard Analysis and Critical Control Points (HACCP) and Good Practices, as introduced by Drs Yamada, Nicolaides and Battaglia.

Safe and high-quality products will be able to be sold at higher prices. However, the prices of primary products usually fluctuate a lot and are lower than those of processed products, as pointed out by Dr Ferris. Selling primary products to processors and traders does not necessarily bring enough profit to local farmers. They have to add value to their primary products by producing marketable and profitable products through on-farm processing, in addition to improving the safety and quality of the primary products. Dr Mrema suggested that the technologies to be used for on-farm processing should be intermediate ones that are simple, unique and original. As an example of intermediate technology for value-addition, Dr Mori introduced his experience of developing technology to increase the amount of gamma-aminobutyric acid (GABA) by incubating brown rice in warm water. The technology needed to enhance the amount of components with physiological functionalities, such as GABA, does not require any sophisticated/expensive facilities and can be conducted easily in the rural areas of developing countries.

Dr Li introduced the status of Chinese traditional foods, with which they have much experience. These foods have a long history, but have not been investigated scientifically. Westernization of lifestyle has led Chinese traditional foods to the edge of being lost. Dr Li emphasized the importance of basic research into traditional foods and improvement of their production and distribution systems. Most traditional foods are produced by small-scale processors under conditions of poor sanitation. Traditional foods should be processed under conditions that meet international food safety requirements. Indigenous plants in developing regions, such as Southeast Asia, possess various physiological functions, as introduced by Drs To, Hermann and Nakahara. Dr Shimizu introduced the Japanese experience of developing various commercial commodities with physiological functions—which indicates that traditional products and foods with unique physiological functions have the potential to pave a way towards value-addition.

Table 2. Activities undertaken by JIRCAS in the postharvest field.

1980–1990s	Mycotoxin contamination of grains
1989–	Stored-product insect pests
1997–	Physiological functionalities of some Thai plants
1997–2003	Chinese Food Resources project; products from soy bean and rice
1998	5th JIRCAS Symposium on Post-harvest Losses
2000–2004	Postharvest Losses project
2002	9th JIRCAS Symposium on Value-addition to Agricultural Products
Future (in addition to the above)	
	– Re-evaluation of traditional products (functionality, safety etc.)
	– Survey of diets
	– Non-food utilization (industrial materials, energy, by-products etc.)

In discussing the direction of postharvest research at the Japan International Research Center for Agricultural Sciences (JIRCAS), we have to take account of past and present research activities at JIRCAS as well as the capacity of JIRCAS and the interests of its partners. The activities regarding postharvest research at JIRCAS are summarized in Table 2. We have dealt with the contamination of grains with mycotoxins, especially aflatoxin, in tropical countries and have developed methods to prevent aflatoxin contamination of grains and their products. JIRCAS held the 5th JIRCAS Symposium on Post-harvest Losses and implemented a research project on the reduction of postharvest losses of grains caused by insects

and improper drying in Southeast Asia. We have been studying the functionality of Southeast Asian indigenous plants and elucidated that some plants possess high levels of physiological functions. In a research project on Chinese food resources, it has been suggested that Chinese traditional foods have high potential in terms of physiological functionality. The presentations and discussions in this symposium have suggested that we may focus on traditional foods and indigenous plants in terms of functionality and safety. Socioeconomic and epidemic studies—such as the survey of diets, including traditional foods and indigenous plants—may be carried out in each region/country as well. In consideration of the current status of the global environment and natural resources, we cannot rule out the research on the development of technologies to convert agricultural products into industrial materials and energy sources as a future direction. Collaboration with international forums is essential in the future expansion of the results obtained in this symposium, as Dr Kainuma suggested.