DEPARTMENT OF SCIENCE AND TECHNOLOGY (DOST),
THE REPUBLIC OF THE PHILIPPINES

PROJECT FOR ENHANCING THE COMPETITIVENESS OF FRESH AND SEMI-PROCESSED AGRICULTURAL PRODUCTS THROUGH THE APPLICATION OF APPROPRIATE AND SUSTAINABLE PACKAGING TECHNOLOGY IN THE REPUBLIC OF THE PHILIPPINES

PROJECT COMPLETION REPORT

MARCH 2017

JAPAN INTERNATIONAL COOPERATION AGENCY

UNICO INTERNATIONAL CORPORATION

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Abbreviations

AMAS	Agribusiness and Marketing Assistance Service
C/P	Counterpart
CAR	Cordillera Administrative Region
DA	Department of Agriculture
DOST	Department of Science and Technology
EPS	Expanded Polystyrene
GDP	Gross Domestic Product
IMF	Intermediate Moisture Food
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
LGU	Local Government Unit
LLDPE	Linear Low Density Polyethylene
M/M	Minutes of Meeting
MAP	Modified Atmosphere Packaging
OPP	Orthophenyl Phenol
PDM	Project Design Matrix
PE	Polyethylene
PP	Polypropylene
PTD	Packaging Technology Division
R/D	Record of Discussion
SME	Small and Medium Enterprise
TWG	Technical Working Group

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ANNEXES

1 Objective, Background and Framework of the Project

1.1 Objective and Background of the Project

The Project was implemented to promote reduction of post-harvest losses of agricultural products in the Philippines, through development and introduction of appropriate transport packaging technology for the selected eight target commodities in their major production areas, while expecting development of technology basis of transport packaging, to contribute to reduction of the losses of other commodities.

Agriculture remains a main industry in the Philippines and farmers make up 27.9% of the entire working population in the country[1]. However, productivity in the agriculture sector remains low and agricultural production amounts to only 10% of GDP[2]. One of the sector's most serious issues is post-harvest loss which substantially reduces the potential value of agricultural products. It is estimated that post-harvest losses for fruits ranges from 5% to 48% and for vegetables 16% to 40%[3]. Where it not for these losses, expected earnings of farmers would have been higher. In the existing supply chain, the major reasons for post-harvest losses particularly during handling and distribution include lack of appropriate technology in transport and freshness-preserving packaging, and physical factors such as impact, vibration, compression, abrasion and mechanical damage. The Project has been implemented to contribute to the reduction of the post-harvest losses, by use of the appropriate packaging by the stakeholders -- growers, distributors and retailers -- for their commodities.

The Packaging Technology Division (PTD) of the Department of Science and Technology (DOST) completed implementation of a JICA-assisted project entitled "Improvement of Packaging Technology for Philippine Food Products in the Regions" from June 2005 to June 2009. The project provided technical assistance to small and medium-sized enterprises (SMEs) in the food processing sector. PTD has applied lessons learned under the project and transferred what was learned on packaging technology improvement to SMEs through its conduct of consultation services and seminars to DOST Regional Offices.

Under the preceding project, basic capacity development was conducted on the freshness preservation packaging for food and the design of transport packaging such as corrugated boxes, as a part of the project. However, there was still need to develop capacities for development of appropriate packaging for transport and freshness preservation that can be applied to semi-

[1] Philippine Statistics Authority (2016), "Results from the October 2016 Labor Force Survey (LFS)"
[2] Philippine Statistics Authority (2016), "Philippine Agriculture in Figures, 2014"
[3] Philippine Development Plan 2011-2016, p.109

processed and fresh agricultural produces, through conduct of verification trials and tests that reflect the needs of possible technology users on the packaging.

Based on the above, the Project was implemented for further enhancement of the capacity of PTD for development and support application of packaging technology for agricultural produce.

1.2 Implementation Framework of the Project

The implementation framework of the Project agreed on between the Philippine Government and JICA is as follows:

1.2.1 Target commodities and target sites

The eight target commodities have already been selected, as shown below for respective target sites where transport packaging technology development is to be demonstrated.

1)	CAR	Benguet	Broccoli
2)			Cauliflower
3)			Cut-flower (Roses)
4)			Cut-flower (Chrysanthemums)
5)	Region 3	Tarlac	Sweet potato
6)		Bataan	Smoked fish
7)	Region 11	Davao City	Durian
8)			Mangosteen

1.2.2 Implementing agency

Packaging Technology Division (PTD) of Department of Science and Technology (DOST)

1.2.3 Scope of the Project

(1) Overall Goal

Based on the know-how to develop the technology through the Project, the appropriate transport packaging technologies are developed and introduced for other fresh and semi-processed agricultural products.

(2) Project Purpose

The post-harvest losses of eight (8) target commodities will be decreased through the introduction of appropriate transport packaging technology.

(3) Outputs

Following are assumed as the expected outputs to achieve the above project purpose:

Output 1: An implementation process of technology development and introduction for eight (8) target commodities is finalized and the necessary planning and preparation are conducted.

Output 2: Appropriate transport packaging technologies for eight (8) target commodities are developed.

Output 3: The developed transport packaging technologies are introduced to the eight (8) target commodities.

(4) Activities

1) For Output 1:

1-1: Formulate the Project Activity Plan and Capacity Development Schedule for PTD staff to develop and introduce the transport packaging.

1-2 Discuss and identify the target sites from major production area and the beneficiaries according to eight (8) target commodities.

1-3 Create the Technical Working Groups according to the target sites and/or developed technology, including the beneficiaries identified through Activity 1-2.

1-4 Formulate the Equipment Procurement Plan and purchase the necessary equipment based on the plan.

1-5 Formulate PTD's Technology Dissemination Plan for the relevant potential technology users, and institutions, which are expected to play supporting role in technology dissemination including DOST Regional Office.

2) For Output 2:

2-1: Develop a process flow for the development of transport packaging technology.

2-2: Conduct a survey to identify the needs for improvement of the current packaging of eight (8) target commodities and define the target of the improvement / development.

2-3: Create the Technical Working Groups based on the Activity 1-3 and confirm the needs of improvement of transport packaging.

2-4: Revise the process flow for the development of transport packaging technology based on Activity 2-2 to 2-3.

2-5: Develop the transport packaging technology to keep the freshness and reduce damage during handling and distribution for eight (8) target commodities in collaboration with TWGs and other relevant agencies.

2-6: Share with TWGs and the concerned organizations the lessons learned from the project activities.

3) For Output 3:

3-1: Collect the necessary information upon the actual packaging technology utilization by the potential technology users.

3-2: Conduct the continuous technical support to technology users involved in Output 2 until the actual technology adoption.

3-3: Develop the training module/manual for the dissemination of the transport packaging technology of eight (8) target commodities, including the lessons learned through Activity 3-2.

3-4: Prepare the schedule for information dissemination of transport packaging with the module/manual through Activity 3-3.

3-5: Technology transfer and dissemination activities are conducted based on the plan and schedule of Activity 1-5 and 3-4.

3-6: Conduct the continuous consultation to technology users, with support of DOST Regional Offices and other relevant institutions, for the actual technology introduction.

1.2.4 Organization structure for the project implementation

The Project was implemented with the following organization structure:

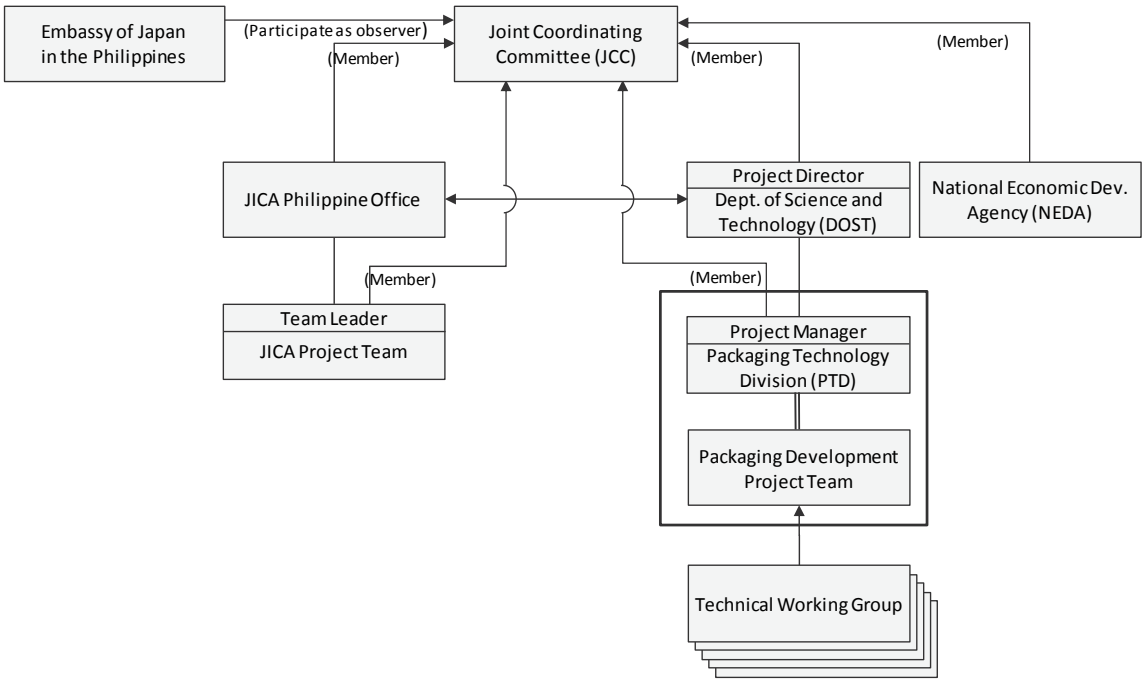


Figure 1 Organization Structure for the Project Implementation

The composition and role of each organization that constitutes the overall structure is outlined below.

(1) Joint Coordinating Committee: JCC

The JCC was formed according to the R/D; it was chaired by DOST's Undersecretary (Project Director) and consisted of representatives of related organizations in the Philippines and Japan. The JCC was responsible for approval of the Project's overall work plans, monitoring of the Project's progress, and discussion on major issues.

(2) Project Manager

PTD's chief acted as project manager and was responsible for supervision and direction of the Project's overall management in collaboration with the JICA Project Team.

(3) PTD Project Team

The PTD Project Team consisted of PTD staff members and was directly involved in activities relating to the development of transport packaging technology, including information gathering and analysis, design and prototyping, testing and commercial development.

(4) Technical Working Groups for Packaging Development

The TWG consisted of potential beneficiaries of newly developed transport packaging technology for each commodity (i.e., farmers/growers, distributors, and retailers), local government units (LGUs), and regional offices of central government organizations. The Groups worked together with the PTD Project Team to develop and commercialize transport packaging technology that meets the actual needs relating to each commodity.

(5) JICA Project Team

The JICA Project Team consisted of experts dispatched by JICA and provided support for implementation of the Project, while giving technical guidance and advice whenever required.

2 Approach for Project Implementation

2.1 Approach from Technical Perspectives

The major focus of the Project is placed not only on technology transfer to the PTD, but also the improvement, through introduction of packaging technologies to be developed under the Project, of competitiveness of the industries making the target agricultural products. Considering these focal objectives, the following two points were determined as the key stance of the approach to the Project in view of technical perspectives. For the examples of activities responding to these approaches, also see Chapter 6 "Implementation Management of the Project, and Lessons Learned."

(1) Technology transfer in consideration of the expected role and function of the PTD as a public research organization

The Project Team has conducted a transfer of technology to the PTD, in consideration of the expected role and function of the PTD as a government research institute in the Philippines in the field of packaging technology, namely:

1) Besides meeting the needs of PTD to provide consultancy services related to the target packaging, the Project was prepared to facilitate the PTD to understand the technological base in the relevant filed, for them to be able to satisfy future needs in the relevant fields of packaging.

2) The Project has also provided technical information on new packaging materials, regardless of current availability of the materials in the Philippines.

3) The Project has given attention to the private packaging industries in the Philippines, considering the possibility of the building of a collaborative relationship between the private sector and PTD for development of packaging technology and services in the country.

4) The Project has prepared Technical Guidelines for Packaging Development, for all the target produce under the Project, with a view for it to be utilized also as reference information for dissemination of packaging technologies in regions by DOST.

(2) Technology transfer in view of supporting enhancement of competitiveness of the relevant agricultural sectors with introduction of the appropriate packaging technology

Another feature of the Project is the fact that it has placed emphasis on application of the developed packaging technology in actual businesses.

1) In line with the above emphasis, the technology transfer was conducted giving due consideration of its applicability in practical use and its economic feasibility. The technology transfer, therefore, partly included introduction of technology, which is not necessarily packaging-related, particularly in the area of post-harvesting and processing, if such technology is considered useful in solving problems or adding value in relation to a specific target commodity (e.g., recommendation on introduction of the curing and the maturing process for sweet potato, development of a new type of smoked fish, and proposal of use of freshness preservation agents for cut-flowers, etc.).

2) In addition, the Project included guidance and advice on development of graphic designs for proposed packaging for the target commodities, considering the effectiveness of the communication function of packaging for dissemination of packaging technology applied to the specific product, with calling attention of distributors and consumers on the proposed technologies.

2.2 Approach from Project Management Perspectives

(1) Packaging development with sharing of the progress and outcomes with stakeholders at the production sites and distributors of the target products

To encourage active participation of stakeholders at the production sites in improvement/development of packaging, a Technical Working Groups were organized in each target site, and the packaging development was conducted with collaboration among the Groups, the PTD's Team and the Project Team, specifically;.

1) Organization of the TWG, and promotion of the understanding of the TWG members on the Project
2) Cooperation in confirming the needs of the production sites and the concerned distributors on the packaging development/improvement, including the collection of data and information necessary for evaluation of the technologies and practices to be developed
3) Cooperation in obtaining the suitable samples of the product for verification trials and tests of effectiveness of the proposed technologies and practices
4) Report of the development results for further collaboration in applying them to the actual scenes

(2) Holistic approach of technology transfer by taking advantage of the counterpart training programs and the PTD's own projects

The PTD has their own on-going projects to improve packaging of agricultural products, while JICA provided counterpart training programs in Japan in relation to the Project. Taking advantage of all of these resources and opportunities available, the Project Team took the holistic approach to ensure the effective technology transfer to the PTD (e.g., the Project referred some data obtained from the PTD's project for verification of the effectiveness of the proposed technologies and practices, etc.)

3 Project Implementation

3.1 Outline of the Implementation Process of the Project

Figure 1 and 2 shows the overall process of the Project implementation. An outline of the proposed packaging and post-harvest practice is included in Chapter 5, and details are included in Annex 8.

(1) Grouping of the target products

The target products were separated into three groups in view of convenience in terms of step-by-step acquisition of freshness preservation technology, and the sequence of the research work was determined separately for each group so that the number of target products to be handled at the same time was limited to two wherever possible. The product groups were formed as shown in Table 1, taking into account factors such as seasonal availability of the products during the process of packaging development, conditions of production sites which might affect the result of the research trials (e.g., improvement of roads from the production site to markets), possibility of securing the required testing and measuring equipment, and the progress of the PTD's relevant on-going projects, etc.

Table 1 Product groups

Product group	Product	Region	Target production site
1st group for the 1st year	Frozen durian	Region 11	Davao City
	Smoked fish	Region 3	Bataan
2nd group for the 2nd year	Sweet potato	Region 3	Tarlac
	Cut-flower (chrysanthemum)	CAR[1]	Benguet
3rd group for the 3rd and 4th years	Broccoli	CAR	Benguet
	Cauliflower	CAR	Benguet
	Cut-flower (rose)	CAR	Benguet
	Mangosteen	Region 11	Davao City

(2) Setting of development phases for implementation

The development phases of implementation consisted of the following.

1. Project Planning and Preparation
2. Transport Packaging Development
3. Introduction and Dissemination of the Developed Packaging Technology

[1] Cordillera Administrative Region

The Project Planning and Preparation Phase was carried out for all the target products at once at the start of the Project, while the other two were implemented group-by-group.

An outline of the activities under the phases is shown in (3) through (5) below.

(3) First phase: Project Planning and Preparation

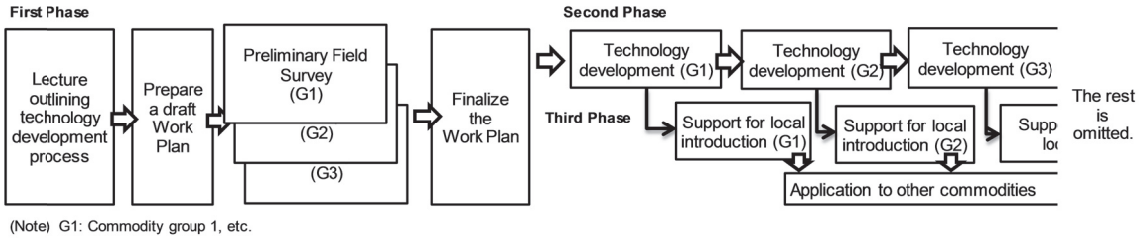


Figure 3 Project Implementation Process

1) Development of the overall Work Plan of the Project

A preliminary draft of the overall Work Plan was prepared on the basis of the detailed activity plans, and presented to JICA and the Philippine counterpart for consultation. Then, the Work Plan was finalized after reflecting the feedback from the consultation.

2) Preliminary field survey

The JICA Project Team conducted the preliminary field survey, jointly with the PTD Project Team, at the production sites of the target commodities. Major survey items were as follows.

1. Preliminary data and information relating to post-harvest practice, storage, handling, and transportation of the target agricultural produce
2. Preliminary survey on possibility to form Technical Working Groups for packaging development in the target Regions
3. Other relevant data and information:
   a) Relating to local suppliers of packaging machinery and materials
   b) Relating to handling, storage and shipment in the Manila markets
   c) Relating to consumers' preferences for each commodity, in terms of freshness, quality and appearance
   d) Relating to food-related laws and regulations

(4) Second Phase: Packaging Development

The subsequent process of packaging development in Phases 2 and 3 was implemented separately for each product group.

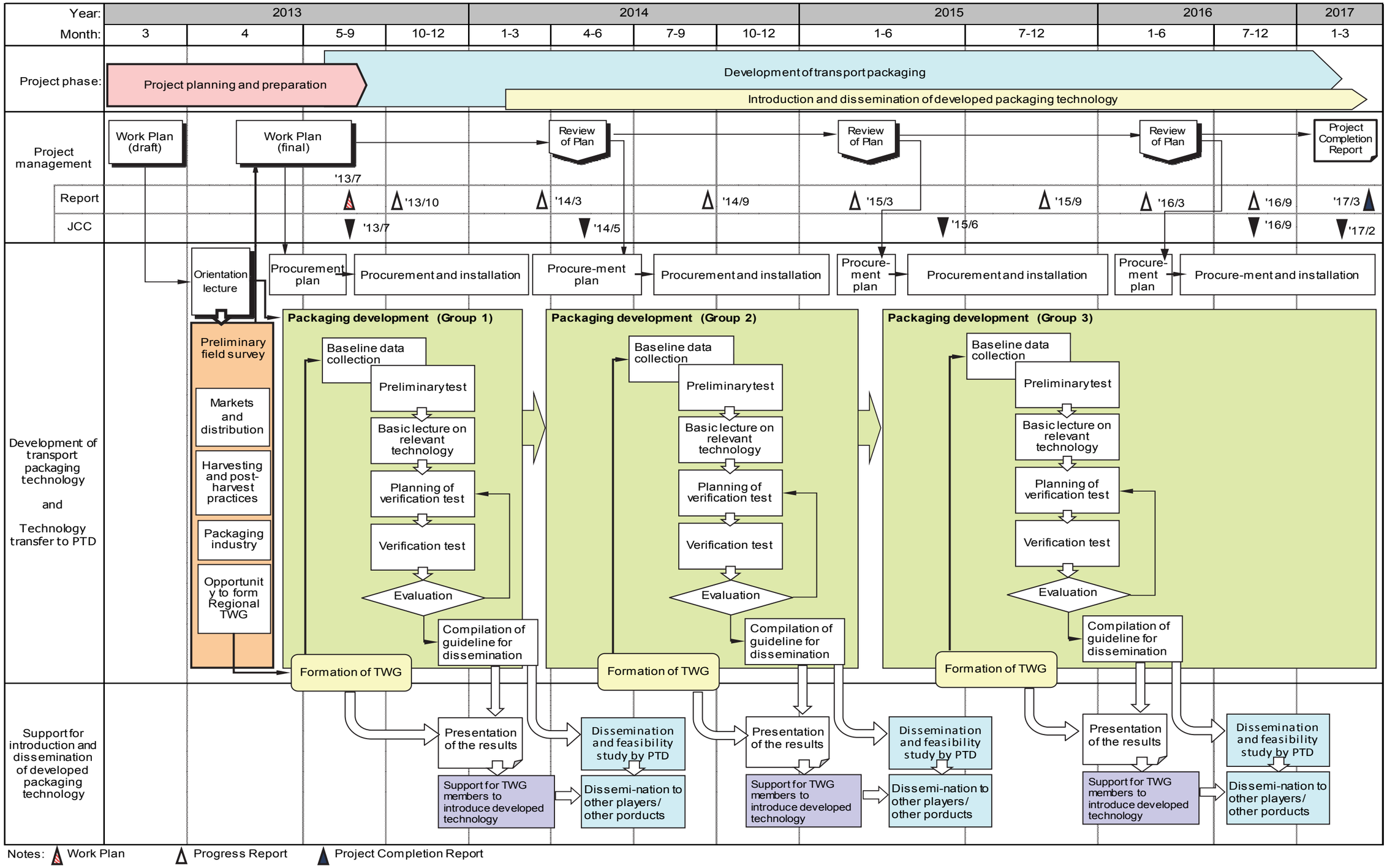


Figure 1 Project Flowchart

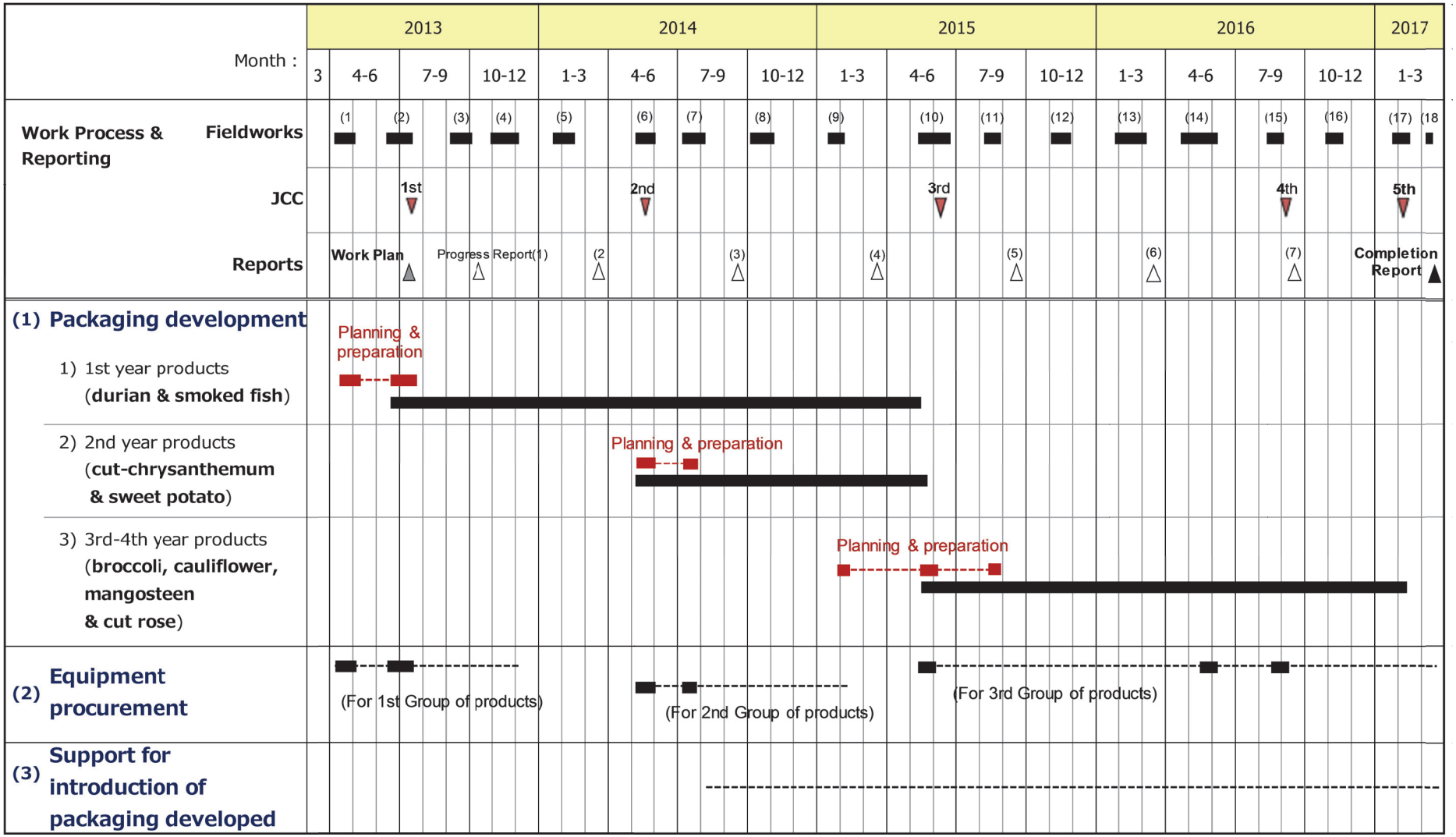


Figure 2 Project Work Process Diagram

1) Organization of the Technical Working Group for region-specific packaging development

The Technical Working Groups (TWGs) for region-specific packaging development were formed to function as the organizations that lead the dissemination of the developed packaging in the respective target areas. The PTD with participation of the JICA Project Team presented the objective of the Project to the TWGs, and collected data and information on local conditions of post-harvest and distribution of the target products, and made a survey on the needs for packaging development. Also requested was their cooperation in obtaining the adequate volume of the target agricultural product for samples for the verification trials.

2) The technology and methods for improvement of post-harvest practices and development of packaging were proposed and their effectiveness was verified through the following procedures, in general (for brief overview of the proposed technology and methods, see Chapter 5):

1. Understanding of the needs of post-harvest practice improvement and packaging development
2. Conduct of actual transportation tests and laboratory tests using sample agricultural produce in relationship with packaging development and post-harvest practice improvement, in order to figure out the losses under current practice conditions and to preliminarily verify the effectiveness of the proposed technology and methods
3. Conduct of tests and trials, on the basis of the above, to verify the effectiveness of the proposed technology and practices, or to define the optimum specifications of them.
4. Final proposal of the recommended technology and practices, which were verified as effective for improvement

3) Lectures on the packaging technologies relevant to the research and development work to be conducted for the target agricultural products

4) Guidance on development of graphic designs of packaging: Application of graphic design for individual packaging and/or collective packaging is effective in generating appeal based on the characteristics of the technology and practices developed and used for this specific product, and in sending a message about the source of the products to distributors and consumers (regional branding). The Project included provision of guidance on development of graphic designs for the packaging of the target products for which the technology and practices developed under the Project are used.

(5) Third phase: Introduction and dissemination of developed packaging technology

1) Summary of the packaging technologies developed, and preparation of a "Guidebook" for reporting the development results to TWG
2) Report to TWG on the development results
3) Support of the potential users of the packaging technology who are interested in applying the development results to their businesses: The Project conducted technical guidance as necessary for those who have shown interest in applying the technology and practices developed, through the reports to the TWGs and through the other opportunities for showing the development results, such as food exhibitions and science and technology exhibitions. In the case of the proposed new type of smoked fish product, the Project conducted an application training program for the smoked fish processors who are interested in the proposed product, to inform them about the critical points to be given attention in processing the product in view of food safety.

3.2 Progress of Activities in Terms of Planned Scope of the Activities

The progress of the Project activities in terms of planned scope of the activities prepared at the start of the Project was as follows (for a brief overview of the activities and outputs of the packaging development and post-harvest practice improvement, see Chapter 5).

Planned scope of the activities	Progress of the activities
1) **Activities for Output 1** (An implementation process of technology development and introduction for eight (8) target commodities is finalized and the necessary planning and preparation are conducted)	
1-1 Formulate the Project Activity Plan and Capacity Development Schedule for PTD staff to develop and introduce the transport packaging.	1) At the start of the Project, the Project Team conducted preliminary surveys at the production sites of all the target products, for review of the current situation and issues of the target sites, in terms of the loss of products in the post-harvest processes, and for confirmation of the need for packaging development. Based on the findings from the preliminary surveys, the Project Team prepared the overall Project Activity Plan (work steps and time framework of them). At the same time, the Project Team decided on the yearly sequence of the packaging development in terms of the groups of the target products. Thus, the framework of the overall Project Activity Plan was formulated. 2) The overall Project Activity Plan was developed as a yearly activity plan, at the start of the 1st, 2nd, and 3rd-4th years, including the packaging development steps for the respective target products, and planning of lectures, sample collection, verification tests and hands-on training for the PTD staff on packaging development. 3) At the start of the respective fieldwork periods, the detailed work schedule including the lecture schedule during the period was prepared and informed to the PTD staff.

Planned scope of the activities	Progress of the activities
1-2 Discuss and identify the target sites from major production areas and the beneficiaries according to eight (8) target commodities.	1) The Project Team proposed the sequence of the yearly packaging development plan in terms of the target product groups, based on the findings of the preliminary field surveys conducted at the start of the Project, and agreed on the proposed sequence with the PTD. 2) At the start of the yearly project activities, the PTD invited the stakeholders of the target products at the target sites to meetings, explained the objective of the Project and made a hearing survey on the needs of the packaging development for the respective target products. The growers and processors among the participants are assumed to be the potential beneficiaries of the packaging development.
1-3 Create the Technical Working Groups according to the target sites and/or developed technology, including the beneficiaries identified through Activity 1-2.	The participants in the meeting of Activity 1-2 above were organized as the members of the TWGs. They were from Regional Offices of DOST, DA-AMAS, Agricultural Office of the LGU, and support program of universities at the site and a cold chain corporation of the LGU, in some cases, in addition to the growers of the target product (or their council), processors and distributors. (Notes): DA-AMAS: Agribusiness and Marketing Assistance Service, Department of Agriculture LGU: Local Government Unit
1-4 Formulate the Equipment Procurement Plan and purchase the necessary equipment based on the plan.	1) The Equipment Procurement Plan was prepared group-by-group for the target products, in advance of the start of packaging development for the group. 2) Procurement of all the equipment necessary for the package development in the 1st year, 2nd year, and 3rd-4th years was completed respectively, and the equipment was handed over to PTD.

Planned scope of the activities	Progress of the activities
1-5 Formulate PTD's Technology Dissemination Plan for the relevant potential technology users, and institutions, which are expected to play supporting role in technology dissemination including DOST Regional Office	1) As for the activities for dissemination and support application of the packaging technologies developed, both the potential technology users and the level of necessary support may vary depending on the technologies developed. Thus, the steps for technology dissemination and application are assumed to consist of two steps. The first step is the step to report the development results to the TWG, commonly applicable for all the target products, whereas the second step is to prepare and implement the application support program according to the support needs of the specific potential technology users. 2) In order to facilitate the dissemination of the packaging technologies developed, a guidebook for the technology users was planned to be prepared for the respective target products. The guidebook was intended to contain an overview of the packaging technology developed and/or proposed post-harvest practices. A guidebook was prepared for each of durian, smoked fish and sweet potato. For other target products, information required for a guidebook is contained in "the technical guideline on improvement of the post-harvest practice and development of packaging" for easy editing of the guidebook when necessary.
2) **Activities for Output 2** (Appropriate transport packaging technologies for eight (8) target commodities are developed)	
2-1 Develop a process flow for the development of transport packaging technology.	1) The process flows for the packaging development, or research plans of packaging development, have been prepared product-by-product at the start of packaging development for the target products. 2) The plans were continued to be reviewed through the packaging development process and updated as was necessary (see Activity 1-2).

Planned scope of the activities	Progress of the activities
2-2 Conduct a survey to identify the needs for improvement of the current packaging of eight target commodities and define the target of the improvement and development	1) Through the preliminary field survey conducted product-by-product at the start of the Project (see 1) of Activity 1-1), the following information were gathered on the target sites of the eight products: - Confirmation of the production sites, and issues relating to the target products - Current situation and needs of development of packaging and improvement of post-harvest practice 2) Based on the above, the primary targets of development of packaging and improvement of post-harvest practice were set for all the eight target products
2-3 Create the Technical Working Groups based on Activity 1-3 and confirm the needs of improvement of transport packaging	1) At the start of the development work for each product group, the detailed surveys were conducted product-by-product through the TWGs which were organized with the stakeholders at the target production sites for the packaging development, regarding current practice, issues, and needs of packaging development and improved post-harvest practices. 2) Based on the above, the target of the packaging development and the improved post-harvest practices was set for the target product of the year (for the targets set, see Chapter 5).
2-4 Revise the process flow for the development of transport packaging technology based on Activities 2-2 and 2-3.	1) The original research plans (see Activity 2-1) were partly revised reflecting the results of Activity 2-3, and through the actual transport tests and the tests and trials at the laboratory, the issues raised were confirmed and the effectiveness of the proposed methods of improvement were tested. 2) Based on the results of the preliminary findings on the effectiveness of the proposed method of improvement, the detailed specifications of the improved packaging and/or post-harvest practices were defined, and the follow-up tests and trials were prepared to verify the effectiveness of the specifications.

Planned scope of the activities	Progress of the activities
2-5 Develop the transport packaging technology to keep the freshness and reduce damage during handling and distribution for eight (8) target commodities in collaboration with Technical Working Groups and other relevant agencies.	1) The verification tests and trials were conducted using the samples obtained from the target production sites, to define the optimum specifications for the improved packaging and post-harvest practices. 2) If the effectiveness of the proposed technologies and methods could not be verified, the specifications were modified based on the findings from the above verification tests and trials, and the follow-up tests and trials were conducted with the samples from the target production sites again. 3) Packaging development works were completed for durian, smoked fish, sweet potato, and cut flowers (chrysanthemum and rose) with the effectiveness of the proposed technologies and methods being verified. 4) As for the broccoli, cauliflower and mangosteen, the planned follow-up tests and trials were either delayed or interrupted because of difficulty in obtaining the appropriate samples for the tests and trials, because of the protracted heavy rains and typhoon attacks at the target sites. As a result, although the effectiveness of the proposed technologies and methods was verified in general, further tests and trials are still necessary to define the optimum specifications of the proposed methods in terms of usefulness and merchantability. (For brief overview of the packaging development and post-harvest practice improvement, see Chapter 5.)
2-6 Share with Technical Working Groups and the concerned organizations the lessons learned from the project activities.	1) For the TWGs organized at the target sites for the respective target products, the Project has tried to encourage their members to actively participate in the TWG meetings, has explained the objective of the Project, and surveyed the members on the current practice, issues, as well as needs of packaging development and improved post-harvest practices as described in Activities 1-2 and 2-3. 2) For the products where the packaging development was completed, the development results were reported to the TWGs, and consultations were held with those who are interested in applying the proposed methods and packaging in their businesses.

Planned scope of the activities	Progress of the activities
2-6 Share with Technical Working Groups and the concerned organizations the lessons learned from the project activities.	So far, the reporting meetings have been held for durian, smoked fish, and sweet potato 3) For cut-chrysanthemums and cut-roses, PTD is planning to hold the TWGs reporting meetings. 4) For broccoli, cauliflower and mangosteen, PTD is planning to hold the reporting meetings after defining the detailed specifications of the proposed technologies and methods, since the follow-up tests and trials are still necessary to define the optimum specifications of them for these products. (PTD is planning to sustain the follow-up verification tests and trials of the proposed technology and methods and the dissemination activities for these products, as their own projects, and to apply for the approval of DOST.)
3) **Activities for Output 3** (The developed transport packaging technologies are introduced to eight (8) target commodities)	
3-1 Collect the necessary information upon the actual packaging technology utilization by the potential technology users.	1) The information on the support activities necessary for the potential technology users in applying the proposed packaging technology was collected, initially through the preliminary field survey (Activity 1-1), and in detail through the TWG meetings (as described in Activity 2-2 above), including the information on current practice of storing, transporting and distributing, and the relevant infrastructure (such as road conditions from farm to market, storage warehouses available at the production sites, distribution system of packaging materials and containers used, and system for returning returnable transport containers, etc.). 2) After completion of the packaging development, the development results were reported to the respective TWGs. In the reporting meetings, consultation was conducted with potential technology users interested in the proposed technology and methods, to identify the activities necessary to support their application.

Planned scope of the activities	Progress of the activities
3-1 Collect the necessary information upon the actual packaging technology utilization by the potential technology users.	3) For the target products other than the smoked fish, it was found that there will be no need of any specific support program or training for the potential users in applying the packaging technology developed, except for procurement of necessary facilities and equipment, procurement of the proposed packaging materials and chemical agents, and acquisition of some technical skills. 4) For the smoked fish, on the other hand, since the technical users need to understand the processing process and confirm some critical points to be cleared up in the process in view of food safety, a training program was decided to be prepared for these purposes.
3-2 Conduct the continuous technical support to technology users involved in Output 2 for the actual technology adoption.	Support for the potential technology users in applying the proposed improvement of post-harvest practice and developed packaging in their businesses was undertaken in the following steps: 1) Report the development results to the TWGs and identify those who are interested in the actual technology adoption. 2) Introduce the developed products and packaging in the relevant local and international exhibitions to obtain responses from the participants, and identify those who are interested in the actual technology adoption. 3) Conduct consultation meetings for those who are interested in application of the proposed technology and methods, as a group or individually. 4) For the target products other than the smoked fish, prepare a briefing session on the application of the proposed technologies and methods, among those who are interested either as a group or individually. 5) For the smoked fish, a training program specific to the product, including hands-on activities, is conducted for those who are interested, since there is a need of the technical users to understand the processing process and confirm some critical points to be cleared up in the process in view of food safety. Further, individual consultation is provided to those who have further difficulty, or need assistance.

Planned scope of the activities	Progress of the activities
3-3 Develop the training module/manual for the dissemination of the transport packaging technology of eight (8) target commodities, including the lessons learned through Activity 3-2.	1) Guidebooks for potential users of the developed technology were prepared for durian, smoked fish, potato, and cut-chrysanthemums. 2) For other target products, which need further research trials to define the specifications of the proposed technology and methods, the Project prepared the technical guidelines for the packaging development for transfer of technology to PTD, and included the contents to be used for preparation of the guidebook, so that PTD can prepare the guidebook compiling the necessary contents from the technology guideline. 3) For the smoked fish, a textbook was prepared for the application training of the proposed products, as mentioned in 5) of Activity 3-2.
3-4 Prepare the schedule for information dissemination of transport packaging with the module/manual through Activity 3-3.	PTD has maintained communications with the potential technology users through regional offices of DOST or directly, and provided support for applications along the steps of Activity 3-2, whenever it was necessary.
3-5 Technology transfer and dissemination activities are conducted based on the plan and schedule of Activity 1-5 and 3-4.	Dissemination of development results and support for the application of them in actual businesses have been conducted as stated in Activity 3-2, as follows: For durian, sweet potato and smoked fish, packaging development results were reported to the respective TWGs, and guidance and support for application was undertaken as need arose: 1) In the case of durian, guidance on the packaging method of frozen products has been conducted for a producer of frozen durian, and assistance was given for procurement of the packaging materials. PTD is ready for further support whenever it is necessary. 2) As for the sweet potato, the report on development results to the TWG has attracted interest of the cooperatives of farmers, LGU and university concerned. However, the application of the proposed method of practice requires some space, like a warehouse, at the production site for storing the harvested sweet potato, and establishment of a system for return of plastic crates used for transportation. Because of these difficulties, the proposed method of post-harvest and transport practice has not yet been materialized.

Planned scope of the activities	Progress of the activities
3-5 Technology transfer and dissemination activities are conducted based on the plan and schedule of Activity 1-5 and 3-4.	(There is a plan to construct a warehouse at the target production site for storing the sweet potato, to take advantage of the farm gate price when it returns to normal after the season, as harvesting is concentrated in a short period, when market price falls. If the planned warehouse is materialized, the proposed method of post-harvest practices is quite likely to be adopted.) 3) Regarding the smoked fish, through the report to the TWG on the result of the development works, processors who are interested in the proposed new method of processing were identified, and an application training program is scheduled in early March 2017 to confirm the critical checkpoints in the process among the technology users in view of food safety. The training materials and equipment were prepared in advance. 4) The development results for smoked fish and sweet potato were presented at local and international exhibitions. The responses from the participants to the results were quite positive, but so far no processors and distributors who showed their interest in adopting the proposed methods have been identified. 5) As described in Activities 2-5 and 2-6, the reporting of the development results of the target products other than the above are either in the stage of preparation for the meetings by PTD or in the stage of finalization of the proposed specifications.
3-6 Conduct the continuous consultation to technology users, with support of DOST Regional Offices and other relevant institutions, for the actual technology introduction.	See progress of Activity 3-5.

4 Achievement of Outputs and Project Purpose

4.1 Achievement of Outputs

The achievement of the expected outputs of the Project was set as follows (see Chapter 5 for the output of the packaging development and post-harvest practice improvement).

Outputs	Achievement
Output 1: An implementation process of technology development and introduction for eight target commodities is finalized and the necessary planning and preparation are conducted. Objectively Verifiable Indicator Deliverables through Activities 1-1 to 1-5 are ready to be utilized	(Achievement in terms of verifiable indicator) All the deliverables through Activities 1-1 to 1-5 were ready to be utilized before the start of the development work for the respective target products, as follows: 1) The overall work plan was prepared at the start of the Project, whereas the packaging development work flow, the lecture plan for PTD staff, and experimental plans were prepared for the target products of the year at the start of the yearly development activities. 2) The target products of the packaging development work were agreed upon on a yearly basis at the start of the Project, and at the start of the yearly development work, Technical Working Groups (TWGs) were organized at the target production sites for the respective target products, among the stakeholders including growers of the target product, processors and distributors, who are assumed to be the direct beneficiaries of the Project, and the relevant government agencies. 3) At the start of the yearly packaging development work, a procurement plan of materials and equipment was prepared covering the requirements for the development work in the year. 4) For the dissemination and application support activities of the results of the development work, two steps were assumed; namely, the first step, to report the development results to the TWGs, and the second step, to extend the support for those who are interested in applying the technologies and methods proposed, according to their specific needs for support. (Details of the achievement) For all the eight target products, needs for packaging development and post-harvest practice improvement were surveyed, the development and improvement targets were defined, and the implementation process of the development and improvement work was proposed, in advance of the start of the respective development and improvement work.

<table>
<tr><th>Outputs</th><th>Achievement</th></tr>
<tr><td>Output 1:
An implementation process of technology development and introduction for eight target commodities is finalized and the necessary planning and preparation are conducted.

<u>Objectively Verifiable Indicator</u>
Deliverables through Activities 1-1 to 1-5 are ready to be utilized</td><td>1) The stakeholders at the target production sites were invited to a presentation of the Project objectives and to participate in a hearing survey of current practice, issues of post-harvest practice, storing, transportation, distribution and packaging of the target products, and needs of development/improvement. The participants in the meeting were organized as members of the TWG for the product. This was the preparatory step for reporting the development results on the packaging development and post-harvest practice improvement, and dissemination of them.
2) The plans for packaging development, technology transfer to PTD, and support application of the development results, were prepared in advance according to the following development work steps:
- At the start of the Project: Overall work plan
- At the start of the yearly development work: Development target determination, planning of verification trials and tests for packaging development, planning of lectures on packaging technologies related to the packaging development in the year
- At the start of the field work: planning of verification trials and tests for packaging development, planning of lectures on packaging technology related to the packaging development during the field work period
3) The materials and equipment necessary for the verification trials and tests were planned, and the arrangements were made for procurement and/or the trial production</td></tr>
<tr><td>Output 2:
Appropriate transport packaging technologies for eight target commodities are developed.

<u>Objectively Verifiable Indicator</u>
The number of developed transport packaging for eight target commodities</td><td>(Achievement in terms of verifiable indicator)
The number of the major development targets of the target products were as follows (see Chapter 5, for details):

<table>
<tr><th>Product</th><th>Number of the major development and improvement targets</th></tr>
<tr><td>Durian</td><td>4</td></tr>
<tr><td>Smoked fish</td><td>3</td></tr>
<tr><td>Sweet potato</td><td>4</td></tr>
<tr><td>Cut-chrysanthemums and roses</td><td>4</td></tr>
<tr><td>Broccoli and cauliflower</td><td>2</td></tr>
<tr><td>Mangosteen</td><td>3</td></tr>
</table>
</td></tr>
</table>

Outputs	Achievement
Output 2: Appropriate transport packaging technologies for eight target commodities are developed. Objectively Verifiable Indicator The number of developed transport packaging for eight target commodities	(Details of the achievement) Trials and verification tests were conducted for all the eight target products, to define the technology and methods effective for proposal: 1) For the five target products of durian, smoked fish, sweet potato, cut-chrysanthemum, and cut-rose, appropriate packaging technology and improved methods of post-harvest practice were proposed to reduce the damage and loss during the transportation and distribution process, and preserve the freshness of the product. 2) For the remaining three products, broccoli, cauliflower and mangosteen, further trials and tests were found necessary to define the optimum specifications of the proposed packaging, because of delay in harvesting of the products and difficulty in obtaining the product of appropriate quality for use as samples for trials and tests, although the effectiveness of the proposed technologies and methods were verified in general.
Output 3: The developed transport packaging technologies are introduced to eight target commodities. Objectively Verifiable Indicator The number of the technology users (inclusive of the concerned beneficiaries under Output 2)	(Achievement in terms of verifiable indicator) The number of those who have been interested in the results of the packaging development and post-harvest practice improvement, including those who were involved in the TWGs, are as follows (each individual person, enterprise, cooperative, and growers-council is counted as one. The number of participants who showed interest in the development results at the exhibitions is not included in the table).

<table>
<tr><th>Outputs</th><th>Achievement</th></tr>
<tr><td>Output 3:
The developed transport packaging technologies are introduced to eight target commodities.

<u>Objectively Verifiable Indicator</u>
The number of the technology users (inclusive of the concerned beneficiaries under Output 2)</td><td>
<table>
<tr><th>Product</th><th>Number of those who are interested in the proposed technology and methods (incl. those who have participated in TWGs)</th><th>Remarks</th></tr>
<tr><td>Durian</td><td>4</td><td>Organization 2
Individual 2</td></tr>
<tr><td>Smoked fish</td><td>5</td><td>SME 4, Fish farm 1</td></tr>
<tr><td>Sweet potato</td><td>4</td><td>Cooperative 2,
SME 1, College 1</td></tr>
<tr><td>Cut-chrysanthemum</td><td>1</td><td>Cooperative 1</td></tr>
<tr><td>Cut-rose</td><td>2</td><td>Cooperative 1
Flower shop 1</td></tr>
<tr><td>Broccoli</td><td>4</td><td>Cooperative 4</td></tr>
<tr><td>Cauliflower</td><td>2</td><td>Cooperative 2</td></tr>
<tr><td>Mangosteen</td><td>7</td><td>Farm & individual 7</td></tr>
</table>
(Detail of the achievement)
1) For durian, smoked fish, and sweet potato, the development results were reported to the respective TWGs for dissemination and promotion of application of the technology and methods to the actual businesses.
• For durian and smoked fish, potential technology users were identified
• For sweet potato, the development results attracted interest of the farmers. However, the application of the proposed method of practice requires space, such as a warehouse, at the production site for curing and maturing, establishment of a return system of plastic crates used for transportation, and initial funds to procure the plastic crates. Because of these difficulties, the proposed method of post-harvest and transport practice has not been materialized yet.
2) For cut-chrysanthemums and cut-roses, PTD is planning to hold reporting meetings for their TWGS for promotion of dissemination and application of the development results.
</td></tr>
</table>

Outputs	Achievement
	3) For broccoli, cauliflower and mangosteen, PTD is planning to have the reporting meetings after defining the detailed specifications of the proposed technologies and methods, since the follow-up tests and trials are still necessary to define the optimum specifications of them for these products.

4.2 Achievement of the Project Purpose

Regarding the achievement of the Project Purpose of ***"****The post-harvest losses of eight target commodities will be decreased through the introduction of appropriate transport packaging"* see Chapter 5.

5 Outline of the Proposed Packaging Development and Post-harvest Practice Improvement

The Project proposed the improvement of packaging and post-harvest practice to meet the need to reduce losses in the post-harvest process including that of transportation and distribution, on the basis of the results of the packaging development work conducted under the Project. This Chapter summarizes the issues and needs of packaging development, proposed appropriate packaging and improved post-harvest practice, and expected reduction of losses, verified experimentally, with adoption of the proposed technology or method.

5.1 Durian

<table>
<tr><td>Development Target (1)</td><td>Packaging which allows transport and handling of frozen flesh of durian without being troubled by the smell</td></tr>
<tr><td>Issues and needs of packaging development</td><td>Smell, which is not necessarily acceptable for all the people, even when the fruit is frozen, is an impediment to market development</td></tr>
<tr><td>Proposed appropriate packaging and/or improved post-harvest practice</td><td>1) Film package of frozen durian with flavor-keeping capacity
2) Use of film free from brittleness during frozen storage</td></tr>
<tr><td>Expected reduction of loss (or increase in value) with adoption of the proposed technology or method

 
</td><td>1) Reduction of the loss of unsold durian due to over-concentration of durian supply within a short period of time, which has been caused by strong seasonality of harvesting durian:
➡ The problem of the unsold loss of around 15% of the total harvest is expected to be solved by promotion of frozen durian combined with use of the proposed flavor-keeping packaging.

(Expected increase in the income by applying the proposed packaging)
<table><tr><td></td><td>Per kg</td><td>Per 1 ha of farm</td></tr><tr><td>Current (fresh durian)</td><td>P. 17</td><td>P. 51,000</td></tr><tr><td>Frozen flesh</td><td>P. 78</td><td>P. 247,000</td></tr><tr><td>Increase in income</td><td>P. 61</td><td>P. 196,000</td></tr></table>(Peso 1 = 2.5 Yen)
• Yield per ha.= 3tons; unsold rate = 15% of harvest; sales price in season = P. 20/kg
• Price of frozen flesh of durian = P. 110/kg (ex-factory), including the cost of packaging material; excluding the freezing costs

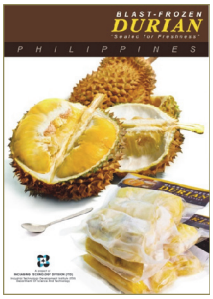
2) Expected development of the market and resultant increase in the sales price by introduction of the improved frozen durian packaging
➡ Expansion of sales from the local sales shops, to the shops targeting visitors, like that of the airport. Further possibility of expansion to the shops in big cities such as those in Manila.

(Difference in the sales price among different market channels)
<table><tr><td>Local shops</td><td>P. 125/pack</td></tr><tr><td>Shops at the airport</td><td>P. 175/pack</td></tr></table></td></tr>
</table>

<table>
<tr><td>Development Target (2)</td><td>Cold storage transport container and carryout box of frozen durian flesh, good for transport or hand-carry to Manila and abroad</td></tr>
<tr><td>Issues and needs of packaging development</td><td>Decrease in sales price, and unsold stock in the harvest season, because of over-concentration of the supply within a short period of time. In order to cope with these issues, the durian flesh is frozen and distributed. However, under the condition of non-existence of a reliable cold-chain system, the frozen product has difficulty in transportation and hand-carrying. The proposed packaging development is to expand the market of the frozen product by facilitating the transportation and hand-carrying eve without a cold chain system.</td></tr>
<tr><td>Proposed appropriate packaging and/or improved post-harvest practice</td><td>Transportation container and carryout box for the frozen flesh having more than 10 and 24 hours cold storage capacity by using refrigerant (10 hours for Manila customers, and 24 hours for visitors abroad)
<table>
<tr><th rowspan="2">For: / Proposed Packaging</th><th colspan="2">Carryout box (for 8 packs**)</th><th>Transportation container (for 50 packs)</th></tr>
<tr><th>For Manila customers</th><th>For visitors abroad</th><th>For Manila customers</th></tr>
<tr><td>Corrugated box</td><td>X</td><td></td><td></td></tr>
<tr><td>Wax-coated corrugated box</td><td>X</td><td></td><td>X</td></tr>
<tr><td>EPS</td><td>X</td><td>X (*)</td><td>(Existing)</td></tr>
</table>
Notes: X: Packaging having the target cold storage capacity
**: 7 packs in the case of EPS (Expandable polystyrene)
(*): With condition to use cooling agent simultaneously</td></tr>
<tr><td>Expected reduction of loss (or increase in value) with adoption of the proposed technology or method</td><td>See 2) of “Development Target (1).”
  </td></tr>
</table>

Development Target (3)	1) Prevention of rotation and movement of the fresh durian in its transport container (box) during transportation and handling 2) Reinforcement of handling holes of transport box of fresh durian
Issues and needs of packaging development	Damage of package and the contained durian during (export) transportation caused by rotation and movement of the durians in the export container (corrugated box)
Proposed appropriate packaging and/or improved post-harvest practice	1) Put a partition in the box to prevent the contained durian from rotation and movement within the box (Use of partition is the existing practice, but need improvement in designing the dimensions of the partition for effective use) 2) Use of a reinforcement board against breakage at the handling holes of corrugated boxes for fresh durian transportation
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of damaged durian for export caused by damage to transportation packages ➡ Reduction of current loss of 15-20% of the shipment (P. 160/kg of farm gate price and P. 20/kg of transportation cost to distant markets per kg)

Development Target (4)	Improvement of the popular image of durian (fresh and frozen) for better merchantability by creating the image of it being easy to hand-carry, and by showing enjoyable eating scenes as in the case of other popular sweets and fruits
Issues and needs of packaging development	Significant difference in images of durian among the people, which is a critical impediment in marketing durian
Proposed appropriate packaging and/or improved post-harvest practice	1) Design development of an easy to use carrying-out box 2) Suggestions on new scenes where people are enjoying durian
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of loss of unsold product caused by over-concentration of the supply in a short period of time due to strong seasonality of the harvest of durian, and the opportunity loss due to sales at the decreased price in season, compared with that after season: ➡ See Development Target (1) & (2)


BLAST-FROZEN
DURIAN
"Sealed for Freshness"
P H I L I P P I N E S


The DURIAN is a fruit that originates in the tropical climate of the PHILIPPINES or Southeast Asia. It is also referred to as the "King of Fruits." Although it is a delicious fruit, it has a foul smell. The fruit has an oblong shape with a thick, greenish-brown thorny skin. It is one of the heaviest fruits available. Length of the fruit can extend to 18 inches with a weight of up to 15 pounds. It contains vitamins A, B1, B3, B6, C and folic acid. The fruit is rich in calcium, phosphorous, potassium and magnesium. Several trace minerals also occur in the fruit. It is a rich source of protein, phytonutrients and simple fats. The rich nutritional content of the fruit assures several health benefits.
The King of Fruits is an excellent source of dietary fiber. This enables proper digestion of foods. It cleanses the digestive tract of toxins which helps to reduce the risk of colon cancer. Fiber also helps to prevent constipation and piles. The durian is one of the few fruits that contains the B group of vitamins. Vitamin B3 helps to maintain a healthy digestive system. Vitamin B1 improves appetite and facilitates production of hydrochloric acid in the stomach. This supports proper food digestion.
How to open:
The fruit contains various minerals, including copper, iron and potassium. Copper and iron are required for the production of red blood cells. The cells play a vital role in the distribution of oxygen throughout the body. A 100 gram serving of durian provides about 440 mg of potassium. Potassium helps to regulate blood pressure, which improves cardiovascular health. The fruit is also rich in manganese which helps to regulate blood sugar levels. Durian is an excellent blood cleanser.
NEW!
BLAST-FROZEN
"Sealed for Freshness"
DURIAN
"King of Fruits"
P H I L I P P I N E S

5.2 Smoked Fish

Development Target (1)	Development of a smoked fish product and its packaging good for storing and distribution for a longer time at the ambient temperature, and palatable in the category of "smoked" fish product
Issues and needs of packaging development	Shelf-life of the smoked fish currently distributed is only 2-3 days at the ambient temperature, confining sales to nearby markets. For distant markets and exports, frozen storage and transportation is required, which is costly and has made participation of small enterprises difficult.
Proposed appropriate packaging and/or improved post-harvest practice	1) Vacuum packaging after improving preservative quality by cooking using pre-mixed seasoning liquid, drying, and hot-smoking, and 2) Sterilization by boiling for prevention of mold growth 3) Prevention of oxidation and browning during storage using high-barrier film for packaging
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of loss of unsold product due to short shelf-life of the product and resultant limitation of the markets to that of short distances only. Another expected effect is savings of costs required for frozen storage and distribution. ➡ 1) Data on the prevailing rate of the unsold loss is not available, since small-scale processors produce the product mostly by orders. 2) Expected saving of the costs required for frozen storage and distribution is estimated to be 5-6% of the sales amount (P.13/kg at P.260/kg of sales price) or P.78,000/month assuming the sale volume are 6,000 kg/month.

Development Target (2)	Standardized transport package (box) to avoid damage during transportation and handling caused by overstuffing
Issues and needs of packaging development	Damage to product in the transportation process due to overstuffing of the product in transportation containers (boxes)
Proposed appropriate packaging and/or improved post-harvest practice	Design and trial use of a standard-size boxes for transport of 5kg/10kg of product 
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of loss caused by reduction of sales prices to be offered because of damage to the product during transportation (or loss of total product value in many cases) ➡ Reduction of sales prices to be offered because of damage to the product: • Damage rate: 15% of total shipment amount • Discounted amount: P. 52/kg with 20% sales price reduction (or 20% of sales price P. 260/kg)

Development Target (3)	Market promotion of the new product smoked fish
Issues and needs of packaging development	The characteristic feature of the new smoked fish product is quite new for the market. The promotion of the new product by sending messages to the market is quite essential.
Proposed appropriate packaging and/or improved post-harvest practice	Development of a container for assembly package for transportation and display at retail shops with a graphic design featuring the appeal of the new product, such as “new-type of product”, “good flavor”.
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of loss of unsold product due to the demand for the product being limited to markets within a short distance, because of the current limitation of short shelf-life of the product ➡ See Development Target (1)

5.3 Sweet Potato

<table>
<tr><td>Development Target (1)</td><td>Increase in product value by reducing the damages and blemishes during the processes of harvest and transportation
1) Reduction of the percentage of off-grade products
2) Increase in value of food grade sweet potato by reducing surface blemishes
3) Increase in the yield rate for export processing by reducing damages</td></tr>
<tr><td>Issues and needs of packaging development</td><td>1) Existence of more than 45% of off-grade produce immediately after harvesting, caused by insect damage and damage in the harvesting process. The off-grade produce is sold at very low prices as raw material for animal feed.
2) The value of sweet potato for food, other than the above-mentioned off-grade, is also low because of prevalent surface bruises
3) The discard rate is as high as 45% for sweet potato for export as raw material for processing abroad</td></tr>
<tr><td>Proposed appropriate packaging and/or improved post-harvest practice</td><td>Introduction of plastic crates to the processes of harvest, transportation and distribution, replacing the currently used packaging of PP (polypropylene) woven sack</td></tr>
<tr><td>Expected reduction of loss (or increase in value) with adoption of the proposed technology or method</td><td>Opportunity loss due to low market prices because of the poor merchantability
➡ Improvement of product quality by use of plastic crates
(% of harvest volume by product grade)<table><tr><th></th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th></tr><tr><td>Current practice (*1)</td><td>0</td><td>3.1</td><td>96.9</td></tr><tr><td>Proposed (*2)</td><td>28.3</td><td>71.7</td><td>0</td></tr></table>Notes: No-food grade product of insect damage and mechanical damage in harvest process is excluded.
(*1): Use of PP woven sack
(*2): Use of plastic crate

The sales amount is expected to be increased by 22% with the proposed practice, assuming the sale prices by grade as follows:
• Grade 1: P. 14.9/kg
• Grade 2: P. 13.5/kg
• Grade 3: P. 11.0/kg</td></tr>
</table>

<table>
<tr><td>Development Target (2)</td><td>Increase in value of food grade sweet potato by reducing surface blemishes</td></tr>
<tr><td>Issues and needs of packaging development</td><td>Prevent the occurrence of surface blemishes in washing process of distribution</td></tr>
<tr><td>Proposed appropriate packaging and/or improved post-harvest practice</td><td>Prevent the occurrence of surface blemishes in the washing process, by adopting curing process after harvesting.
(Prevention of blemishes in the process of transportation and handling is also recommended to be undertaken with the proposed method under “Development Target (1)” above.)</td></tr>
<tr><td>Expected reduction of loss (or increase in value) with adoption of the proposed technology or method</td><td>Reduction of opportunity loss due to low market prices because of the poor merchantability
➡ Decrease in occurrence of bruises at the time of washing, by undertaking of curing
(Difference in % occurrence rate of bruises in the washing process according to duration of curing)
<table>
<tr><th>Duration of curing</th><th>Case (A)</th><th>Case (B)</th></tr>
<tr><td>7 days</td><td>19</td><td>17</td></tr>
<tr><td>13 days</td><td>8</td><td>5</td></tr>
</table>
Notes: Case A: Use of PP woven bags for harvesting and transport
Case B: Use of crates for harvesting and PP woven bags for transport</td></tr>
</table>

Development Target (3)	Increase in value of food grade sweet potato by increasing the sugar content
Issues and needs of packaging development	1) Value of sweet potato for food, other than the above-mentioned off-grade, is low also because of low sugar content 2) Decrease in selling prices in season because of high seasonal concentration of supply
Proposed appropriate packaging and/or improved post-harvest practice	1) Increase in sugar content by use of a maturing process 2) Suggestions on new types of processing and cooking of sweet potato for creation of new demand (Maturing is also effective in controlling the supply timing, since maturing is undertaken by low-temperature (13℃) storage at the production site.)
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	1) Reduction of opportunity loss due to low market prices because of the poor merchantability: ➡ Regarding the effects of applying the proposed method, see Development Target (1) 2) Reduction of loss because of price decrease caused by concentration of supply in a certain period (and loss caused by being forced to ship even at the time of low sales price) ➡ For reference, the sales prices, ・In season: P.500/90kg ・Out of season: P.1,000/90kg

Development Target (4)	Promotion of sweet potato of high sugar content having beautiful skin as a new type of sweet potato
Issues and needs of packaging development	Image of sweet potato as a low value vegetable has been fixed long term among the consumers, because of its bad appearance and low sugar content. For dissemination of this new type of product using the proposed technology and practice, undertaking of new promotion activity is essential by appealing the characteristic feature of the product among the consumers.
Proposed appropriate packaging and/or improved post-harvest practice	Development of a container for transportation and display at retail shops with a design communicating the appeal of features of the new sweet potato, such as “new type of product”, “sweetness”, as well as the company brand and name of the place of origin
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Prevention of opportunity loss due to low market prices because of the poor merchantability ➡ Regarding the effects of applying the proposed method, see Development Target (1)

5.4 Cut-chrysanthemum and -Rose

<table>
<tr><td>Development Target (1)</td><td>Alleviation of narrow timing of shipment by prolonging vase-life</td></tr>
<tr><td>Issues and needs of packaging development</td><td>Difficulty in managing the harvest and shipment timing to the high demand season, because of the limitation of the season to a narrow specific period of time</td></tr>
<tr><td>Proposed appropriate packaging and/or improved post-harvest practice</td><td>Preservation of freshness longer by use of freshness keeping agents</td></tr>
<tr><td>Expected reduction of loss (or increase in value) with adoption of the proposed technology or method</td><td>Reduction of loss of unsold product caused by mismatching of the harvest timing and the sales timing, and opportunity loss due to price decrease after the sales timing
➡ By use of freshness keeping agents, harvest can be made in advance to the shipment time, instead of making it on timing
(Freshness preservation effect by use of freshness keeping agents: Chrysanthemum, at 30℃)
<table>
<tr><td rowspan="2"></td><td colspan="2">Vase-life (days)</td><td rowspan="2">Growth of flower (harvested at bud stage) Growth rate (%), Flower diameter (mm)</td></tr>
<tr><td>Harvested at full-bloom stage</td><td>Harvested at bud stage</td></tr>
<tr><td>Without use of the agents</td><td>6</td><td>9</td><td>217%
76mm</td></tr>
<tr><td>With use of the agents</td><td>20</td><td>23</td><td>326%
110mm</td></tr>
</table>
(Freshness preservation effect by use of freshness keeping agents: Rose, at 30℃, harvested at bud stage)
<table>
<tr><td></td><td>Vase-life (days)</td><td>Growth of flower Growth rate (%), Flower diameter (mm)</td></tr>
<tr><td>Without use of the agents</td><td>5</td><td>159%
61mm</td></tr>
<tr><td>With use of the agents</td><td>7</td><td>305%
104mm</td></tr>
</table>
(Price difference between high demand season and after high demand season)
<table>
<tr><td></td><td>High demand season</td><td>After the season</td></tr>
<tr><td>Chrysanthemum</td><td>P. 200/dozen or higher</td><td>P. 100～150/dozen</td></tr>
<tr><td>Rose</td><td>P. 350/dozen</td><td>P. 15/dozen</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Development Target (2)</td><td>Harvest and shipment at bud stage</td></tr>
<tr><td>Issues and needs of packaging development</td><td>1) Difficulty in shipment on time meeting the limited high demand season, due to un-uniformly distributed growth situation of flower
2) Low efficiency of transportation of flower in full-bloom stage, because of big difference in size of flower at flower part and stem part
3) High damage rate in the process of handling and transportation resulted from compression of the flowers in transportation package (container/box)</td></tr>
<tr><td>Proposed appropriate packaging and/or improved post-harvest practice</td><td>Harvest and shipment at bud stage using freshness keeping agents to ensure the blooming
(Use of freshness keeping agents as an energy source to ensure the blooming after keeping them at low temperature.)</td></tr>
<tr><td>Expected reduction of loss (or increase in value) with adoption of the proposed technology or method</td><td>1) Reduction of loss of unsold product caused by delay of harvest timing to the high demand season, and opportunity loss due to price decrease after the high demand season
➡ By harvesting at bud stage, the harvest time can be put ahead of that of full-bloom stage, so that the shipment time can be set at the high demand season by controlling blooming with use of freshness keeping agents as an energy source to ensure the blooming (regarding the effect of this proposed method, see “Development Target (1)”).

2) Reduction of loss by shipment at bud stage, because of higher transportation efficiency and low occurrence rate of damage during transportation, compared with that of shipment at full-bloom stage
➡ Increased transportation efficiency by transportation at bud stage

(Difference in storing capacity of transportation box with dimension of W810 x L450 x H300: Chrysanthemum, in dozen)
<table>
<tr><td></td><td>Transportation efficiency</td><td>Damage occurrence rate during transportation</td></tr>
<tr><td>Harvest at full-bloom stage</td><td>24 dozens</td><td>58.7%</td></tr>
<tr><td>Harvest at bud stage</td><td>40 dozens</td><td>21.2%</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td>Development Target (3)</td><td>Prevention of damages of the product in the transportation container/ box in the transportation and handling process</td></tr>
<tr><td>Issues and needs of packaging development</td><td>High damage rate due to compression of the product during handling and transportation</td></tr>
<tr><td>Proposed appropriate packaging and/or improved post-harvest practice</td><td>1) Design and use a standard-size transport box for transportation of appropriate number of cut flowers, to prevent compression in transport containers
2) Reduction of damages on the flower by improving the placement method of flower in the transportation container/box
3) Reduction of damages on the flower using crumpled newspaper in the container/box as a cushioning material</td></tr>
<tr><td>Expected reduction of loss (or increase in value) with adoption of the proposed technology or method</td><td>Reduction of loss due to damages on the product in the transportation container/box
➡ Reduction of damages on the product by improving the placement method of flower and by use of crumpled newspaper as cushioning material (Result of the actual transportation test)

(Product: Rose, upper: number of reject (% of total in pcs), lower: damage rate (% of total in pcs including non-reject damage))
<table><tr><td colspan="2" rowspan="2"></td><td>Placement method in container</td></tr><tr><td>Vertical placement</td><td>Horizontal placement in 4 layers</td></tr><tr><td rowspan="2">Crumpled newspaper as cushioning material</td><td>With</td><td>0%
16.7%</td><td>0%
20.1%</td></tr><tr><td>Without</td><td>0%
16.7%</td><td>1.4%
38.2%</td></tr></table>
➡ For the economic impact of reduction of damages, see “Development Target (1)”</td></tr>
</table>

5.5 Broccoli and Cauliflower

Development Target (1)	Development of packaging effective for prolonged freshness preservation
Issues and needs of packaging development	Rapid quality deterioration after harvest
Proposed appropriate packaging and/or improved post-harvest practice	1) Preservation of freshness by use of modified atmosphere packaging (MAP) 2) Prevention of transpiration by use of film packaging (Need further trials to obtain the optimum specifications of the proposed film packaging)
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of loss of unsold product due to rapid quality deterioration, and/or opportunity loss due to price decrease thereof ➡ Elimination of the unsold loss of 15% of total sales amount at the sale price P. 120/kg (in the case of trimmed broccoli) by prolonging the shelf-life by 2 days with use of the proposed film packaging

<table>
<tr><td>Development Target (2)</td><td>Improvement of transportation efficiency by trimming the produce at the early stage of distribution after harvest, with prevention of damage on the trimmed produce</td></tr>
<tr><td>Issues and needs of packaging development</td><td>1) Low efficiency of transportation because of the current practice to wrap the florets in leaves
2) High rate of occurrence of damage because of overstuffing of the produce in transport packages
3) Quality deterioration in the transportation process due to use of inappropriate transport containers (PE bags, bamboo baskets, reused corrugated boxes, etc.)</td></tr>
<tr><td>Proposed appropriate packaging and/or improved post-harvest practice</td><td>Prevention of damages on the trimmed produce in the transportation process, by:
1) Use of plastic crate or corrugated box for transportation
2) Improvement of placement method of the produce in the transportation container (box), together with use of crumpled newspaper as cushioning material</td></tr>
<tr><td>Expected reduction of loss (or increase in value) with adoption of the proposed technology or method</td><td>1) Reduction of damage of product during transportation:
➡ Decrease in damage occurrence rate (% of total transported) by the proposed packing practice
<table>
<tr><td></td><td>Packing practice</td><td>Damage rate (%)</td></tr>
<tr><td>Current</td><td>Random placement</td><td>40</td></tr>
<tr><td>Proposed</td><td>Vertical placement in one layer</td><td>0</td></tr>
<tr><td>(Reference)</td><td>Horizontal placement in two layers</td><td>37</td></tr>
</table>
2) Improvement of the lowered transportation efficiency caused by transportation of unnecessary parts of the produce:
➡ Increase in transport efficiency by undertaking trimming of the produce (weight/pcs in kg)
<table>
<tr><td>Without trimming</td><td>0.62</td></tr>
<tr><td>With trimming</td><td>0.32</td></tr>
</table></td></tr>
</table>

5.6 Mangosteen

Development Target (1)	Prevention of rapid quality deterioration at the ambient temperature after harvest
Issues and needs of packaging development	Loss caused by over-concentration of supply within a short period of harvest season due to strong seasonality of harvest timing, rapid quality deterioration and resultant unsold produce
Proposed appropriate packaging and/or improved post-harvest practice	1) Freshness preservation by MAP (Modified Atmosphere Packaging) 2) Prevention of transpiration by use of film packaging (Need further trials to derive optimum specifications of the proposed film packaging)
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of loss of unsold produce due to rapid quality deterioration, and reduction of opportunity loss with price decrease thereof ➡ Elimination of unsold loss: P. 5.3/kg of product, with assumptions of, ・ Current unsold loss rate: 15% ・ Extension of shelf-life with MAP: 2 days (with use of LLDPE pouch) ・ Sales price: P. 35/kg

Development Target (2)	Prevention of rapid deterioration of quality after taking out them from low-temperature storing in long term
Issues and needs of packaging development	It is well-known fact that low-temperature storage is an effective measure to prevent deterioration of quality. However, after taking the produce out the refrigerator, the quality is deteriorated within short period of one or two days only. Thus, low-temperature storage is not practical in prolonging the shelf-life of the mangosteen particularly for business use.
Proposed appropriate packaging and/or improved post-harvest practice	Prevention of mold growth on the surface of the produce by prior coating of fungicide (OPP (*) or hypochlorous acid) on the surface (Need confirmation of effectiveness)
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of loss of unsold produce due to limited harvest season, and due to rapid quality deterioration, and reduction of opportunity loss with price decrease thereof (Need confirmation of effectiveness) ➡ See “Development Target (1)”

Note: (*) Orthophenyl phenol

Development Target (3)	Prevention of quality deterioration of frozen mangosteen
Issues and needs of packaging development	Development of frozen product of mangosteen is useful in avoiding loss of unsold produce, under the situation of over-concentration of harvest, and therefore supply, in a short period due to the strong seasonality of the fruit, besides rapid deterioration of the quality at the ambient temperature. However, the frozen products are already popular in the global markets. Hence, the Project made a research on risk of quality deterioration of the frozen product in the frozen storage process, and tried to confirm the effectiveness of the measures against the possible deterioration.
Proposed appropriate packaging and/or improved post-harvest practice	Pre-treatment for quality preservation of the frozen product by a solution of calcium chloride and citric acid just before freezing (Need reconfirm of effectiveness)
Expected reduction of loss (or increase in value) with adoption of the proposed technology or method	Reduction of loss of unsold produce due to rapid quality deterioration, and opportunity loss from price decrease thereof ➡ See “Development Target (1)”

6 Implementation Management of the Project, and Lessons Learned

In this project, adoption of the developed packaging technologies and improved post-harvest practices in the actual business activities is especially emphasized as the project purpose. In reality, however, the application of them in actual business is not necessarily easy. The conditions required for application of them are not fulfilled in many cases, particularly in the case of SMEs.

For both growers (farmers) and SME processors, daily operation of their business has the priority, and it is difficult for them to review and evaluate the possibility of new businesses, owing to lack of time. This is especially so in busy seasons for those agriculture related businesses which have significant seasonality. Off-season gives them different type of challenges, namely unavailability of product samples for trials.

Other difficulties they will face include limitations imposed by the small size of their operations, resulting in difficulty in obtaining packaging materials which are not commonly used in the country. Difficulty in making investments in equipment within a short period is another problem they have to tackle.

The potential technology users, like farmers for example, sometimes cannot well recognize the seriousness of damages in the transportation process of their products, partly because of the distribution system which prevent them from recognizing it as loss. Buyers offer their buying price by weight, seemingly without taking into account of the possible damage in the transportation process. However, actually, the price is offered subtracting the possible damages in the transportation process in advance.

Nevertheless, according to the research results obtained to date, in most cases the amount of cost increase required for undertaking the proposed measures is far less than the amount of benefit that can be expected from the undertaking. Thus, adoption of the proposed technologies and methods is quite prospective, although it might take some more time to be realized.

If one takes the above points into consideration, the technology and methods proposed in the Project have the potentiality of being appropriately appreciated in the future. Therefore, effective transfer of the said technologies to PTD will be quite meaningful.

From the above point of view, we have assigned importance in making the technology transfer effective by the following approach.

6.1 In View of Technologies to be Transferred

(1) Focus on understanding of relationship between physiological activities and deterioration of freshness and quality of agricultural produce as a theoretical basis of packaging development

The Project put emphasis on understanding of relationship between physiological nature and their deterioration of the freshness and quality of the agricultural produce in the storing and transportation process, besides packaging technology.

Based on the above, the Project also included the transfer of the skills needed to measure the physiological activities of the agricultural produce, such as measurement of respiration rate and transpiration level, etc., so as to be able to apply the skills to other produce.

(2) For facilitation of extended application to agricultural produces other than the target produces

The Project emphasizes the technology development on the specific produce in the specific production sites. However, considering the possibility of extended application of the results of the development work to the other agricultural produces than the target produces at the target production sites, the target products have been treated under the broader categories of the products; namely “vegetable in general” in the case of broccoli and cauliflower, “root crops with sugar content” for sweet potato, and “intermediate moisture foods” for smoked fish, etc.

By doing so, we believe PTD could take hints from the trials for application of them to other produces under the same categories.

(3) Focus on opportunity loss and value adding of the target agricultural produces, besides the focus on loss due to damage of the produce

The major focus of the development work of the Project was placed on reduction of loss caused by damage in the transport and distribution process. However, according to the findings from the surveys and verification trials, there seem to be many cases of loss in the sense of possible opportunity of realizing the demand for the target agricultural produces, and also loss of opportunities for adding value. Considering this situation, the Project also tried to focus on these areas.

(4) Limitation of packaging development focusing only on issues specific to the target produce (need of focus on development of distribution infrastructure)

Under the current condition of lack of low temperature storage and transportation facilities and service, packaging development work had to assume the future actual development would be under the condition of ambient temperature. However, the packaging development under this condition tends to result in various constraints and difficulty, which the packaging technology in general cannot clear, or result in problems which are not addressed by the packaging technology

in general.

It is the basic understanding that freshness preservation in food distribution should assume pre-cooling at the production site and low temperature distribution. The packaging development under the current Project, however, has to assume unavailability of these conditions, and in addition, the ambient temperature here is 30℃ or above, resulting in the problems of moisture, dew formation and mold growth in the packaging and packaged products. Under such conditions, recommendations on needs for development of the infrastructure such as pre-cooling facility at the production site and a cold chain system should also be given attention on behalf of a sustainable solution of the problems.

(5) Need for finding solutions from a point of view different from the existing conditions

There are some cases which need review the appropriateness of the existing condition itself, in view of cultivation technology and variety of the produce.

In the case of sweet potato in this Project, for example, it is the second crop of paddy cultivation. For harvest of the sweet potato, farmers use a buffalo for plowing, since the soil is very hard. This practice is found the major cause of damage to the harvested sweet potato, accounting for more than 40% of the total harvested produce. In this case, without improvement of the soil conditions, issue of high occurrence rate of non-food grade sweet potato cannot be solved although it is the issue out of the scope of packaging technologies.

(6) Role of packaging graphic design for dissemination of the proposed technology and methods

The communication function of packaging can play an important role in appealing the advantages of the product, which use this specific packaging (and the packaging technologies), and the name of the production site for consumers. From this point of view, we have included the graphic design development as a follow-up process of the packaging development from the start of this Project. As a result, the output of the development work could have attracted the interest of participants when the results of the packaging development were presented in the local and international exhibitions.

6.2 In View of Effective Conduct of Technology Transfer

Besides the above mentioned considerations on the technologies for transfer, the Project also tried to make the technology transfer effective from the perspective of implementation management, as follows:

(1) Sharing of the development targets and the progress of development among the Project Team and PTD staff

Although the development work has been conducted jointly with the research groups of PTD, which were organized for the respective target products, we have assigned emphasis also to sharing the contents and the progress of all the development work across the groups. For this purpose,

1. We had an orientation meeting with all the PTD staff at the start of the each fieldwork period, to share the development work schedule for the fieldwork period with the PTD members regardless of the groups they belong to.
2. We also had a wrap-up meeting with all the PTD staff at the end of the each fieldwork period, to confirm the achievement of the development work, and work to be conducted by PTD until the next fieldwork period, as well as the next fieldwork schedule.

(2) Confirmation of outcomes of the development work, with preparation of Technical Guidelines summarizing the development work and their achievement

All the major data and information related to the development work were compiled into "Technical Guideline for Development and Dissemination of Packaging Technologies", including the record of technology development, summary of data, and key points for technology dissemination, etc. The guideline is a summary of the development work conducted by the Project and, at the same time, plays an important role as a basis of preparing Guidebooks for applying the proposed technologies and methods. It also provides basic knowledge to apply the technology and methods to other produces. The Guideline was prepared to be utilized for compiling materials for technology guidance and dissemination, by extracting the necessary data and information from the Guideline.

6.3 For Facilitation for Adoption of the Packaging Development Results to the Actual Businesses

The packaging development and post-harvest practice improvement proposed under the Project involve challenges effective for development of the agricultural sector and the related businesses. Adoption of the technologies and methods proposed by the Project, and extension of the adoption to the other agricultural produce and commodities, therefore, is expected to have a significant impact on the competitiveness of the relevant agricultural and business sectors.

However, successful adoption of the technologies and methods requires development of some conditions in advance, as already experienced in the Project also.

The current project was planned as a project to be conducted within PTD's scope of responsibilities related to packaging technology. However, in view of promotion of adoption of the Project outputs in the actual businesses, the activities within PTD's scope alone will be insufficient. They need multidimensional supports in the areas of agricultural technology, management, financing, distribution system, processing technology and facilities, and so on. Following proposes two types of possible approaches, which can facilitate the adoption of the Project output, although it includes the undertakings beyond the PTD's presumed responsibility.

(1) Assignment of the promotion function of the technology application to a separate project from the technology development project

Most of the technology development projects have been conducted in the specific field of technology, with lead of the government agency concerned in this specific field, as in the case of this Project. As a result, the support, which can be made available for development of the conditions necessary in adopting the technology and methods, has been limited. This was one of the difficulty most of the projects have faced in promoting the application of the project outputs.

In order to cope with this issue, we propose to assign the expected outcome of the project into two separate projects, namely, technology development for one, and application for another. For the application project, the project is recommended to work with organization of the stakeholders active in adopting the project outputs from their strategic point of view. These types of stakeholders can be found among the organizations under the industrial cluster approach, which can be found in the areas where a specific industry is accumulated together with the related industries and organizations.

They are quite active to coordinate and adopt the proposed technology and methods so long as they understand the strategic importance of the proposed activities. The organization will take the lead in conducting the project, instead of the government agencies. They pursue the necessary

supports from the government agencies and organizations in line with the strategic needs for enhancement of their competitiveness; for example, PTD for support in the field of packaging technology, DA for cultivation and management of agriculture, DTI for development of business environment, etc.

(2) Supply-side approach by building a sustainable mechanism to promote development of packaging technologies in the country

This is another approach for promotion of adoption of the packaging technology from the supply side of packaging. This practice can be seen already at the level of big enterprises in cooperation with packaging suppliers.

The development of collaboration with the private sector packaging industries will play an important role in the future for packaging development and promotion of dissemination of the results of development work in the Philippines. From this standpoint, the Project has included the programs of visiting some private sector enterprises of packaging material and container suppliers, while providing them with information on the Project purpose and activities included, etc., expecting future collaborative works with PTD. In the same way, in the case of the smoked fish development, the Project team worked together with a local private machinery fabricator in development of the equipment for smoked food processing.

In the future, further development of collaborative relationships with private sector packaging enterprises is expected particularly for development of basic mechanism of improved distribution, such as cold chain system, as well as promotion of the packaging technology among SMEs, with support of the packaging companies in trial production of packaging, introduction of new packaging materials into the country, and technology information exchange on the basis of these experiences gained through collaboration. A joint research project with PTD could be a good example of collaboration with engineers and researchers in the industry.

6.4 Other Lessons Learnt

(1) Difficulty due to agricultural produce as the object of the Project

Since middle of 2015, Philippines had been hit by major typhoons and prolonged rains, resulting in quality deterioration and poor harvest in the case of vegetables, and poor flowering in the case of fruits, besides closure of access roads from the target production sites. As a result, the Project has often faced difficulty in obtaining the samples of target produce for verification tests and trials. In addition, the quality of samples obtained was not suitable for reliable tests and trials, resulting in significant delay in the development schedule particularly in the third and fourth years of the Project. The samples were procured from other sources also as alternatives to the original target sites, but again, the quality of them was not suitable for verification of the proposed technologies and methods.

On the basis of the above, the lessons learnt was the fact that implementation schedule should be flexible enough to be able to adjust it to changes caused by the unforeseeable natural conditions.

In the case of this Project, the development work under the Project has been undertaken up to the steps where the direction of appropriate packaging is identified, and the remaining stages of the packaging development to define the optimum specifications of the proposed packaging were decided to be left for the PTD's own project after termination of the current Project. PTD has applied for the own project to DOST for this purpose.

(2) Need for due consideration of the target beneficiary of the Project for promotion target of application of the development results in the actual businesses

PTD has a lot of experience in offering consultation for SMEs, and realized the adoption of the improved packaging by means of its continuous support for improvement. PTD is maintaining communications with these technology users, and is keeping the records in its database. Nevertheless, the application of the proposed technology and methods has not shown good progress under this Project, as stated in the first part of 6.1. This is partly because of the fact that the proposed technology and methods under the Project are not the type of technology and methods commonly used in the operations of the target potential users under this Project. In such cases, it seems that the adoption of the technology and methods will take a long time, particularly in the case of technology use by cooperatives and individual farmers. It is also the same for the small and micro enterprises. This type of proposal should have been tried by the medium sized enterprises first.

ANNEXES

Annex 1-1

Project Design Matrix

Annex 1-1: Project Design Matrix

Version 1.0

Dated 18 June 2015

Project Title: **Project for Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Appropriate and Sustainable Packaging Technology in the Philippines**

CP Agency: DOST-PTD (Packaging Technology Division)

Target Site (major production area) & Commodity:

1) CAR (Benguet): Broccoli, Cauliflower, Cut-Flower (Roses, Chrysanthemum); 2) Region 3: Sweet Potato (Tarlac), Smoked Fish (Bataan); 3) Region-XI (Davao City) Durian, Mangosteen

Project Period: March 2013 – March 2017 (4 years)

Beneficiary: (a) Farmers, (b) Distributors (processing companies, wholesale distributors, logistic providers), (c) Retailers

Narrative Summary	Objectively Verifiable Indicator	Means of Verification	Important Assumption
Overall Goal: Based on the know-how to develop the technology through the Project, the appropriate transport packaging technologies are developed and introduced for other fresh and semi-processed agricultural products.	Transport packaging developed at least for three (3) commodities aside from eight (8) target commodities covered by the Project	- PTD Annual Report	
Project Purpose: The post-harvest losses of eight (8) target commodities will be decreased through the introduction of appropriate transport packaging technology.	Reduction rate of post-harvest losses to be verified experimentally for the eight (8) target commodities	- Project progress report	There is a need of transport packaging technology for other commodities.

Narrative Summary	Objectively Verifiable Indicator	Means of Verification	Important Assumption
Outputs: 1. An implementation process of technology development and introduction for eight (8) target commodities is finalized and the necessary planning and preparation are conducted.	1-1 Deliverables through Activity 1-1 to 1-6 are ready to be utilized.	(1) - Project Implementation Plan - Project progress report	The GOP policy in relation to packaging technology development is continued. Natural disaster and/or climate change do not affect the production of eight (8) target agricultural products.
2. Appropriate transport packaging technologies for eight (8) target commodities are developed.	2-1 The number of developed transport packaging for eight (8) target commodities.	(2) - Project progress report	
3. The developed transport packaging technologies are introduced to the eight (8) target commodities.	3-1 The number of the technology users (inclusive of the concerned beneficiaries under Output 2)	(3) - Project progress report - Manual / Guideline for the packaging development and application	

Activities	Inputs		Important Assumption
	The Japanese Side	The Philippine Side	
1-1 Formulate the Project Activity Plan and Capacity Development Schedule for PTD staff to develop and introduce the transport packaging. 1-2 Discuss and identify the target sites from major production area and the beneficiaries according to eight (8) target commodities. 1-3 Create the Technical Working Groups according to the target sites and/or developed technology, including the beneficiaries identified through Activity 1-2. 1-4 Formulate the Equipment Procurement Plan and purchase the necessary equipment based on the plan. 1-5 Formulate PTD's Technology Dissemination Plan for the relevant potential technology users, and institutions, which are expected to play supporting role in technology dissemination including DOST Regional Office. 2-1 Develop a process flow for the development of transport packaging technology. 2-2 Conduct a survey to identify the needs for improvement of the current packaging of eight (8) target commodities and define the target of the improvement / development. 2-3 Create the Technical Working Groups based on the Activity 1-3 and confirm the needs of improvement of transport packaging. 2-4 Revise the process flow for the development of transport packaging technology based on Activity 2-2 to 2-3.	**<Japanese Experts>** 1 Project Manager 2 Transport Packaging Technology 3 Post-harvest Treatment 4 Freshness Keeping Packaging (MAP) 5 Marketing 6 Other experts with specific fields of technical expertise, as need arises **<Equipment>** 1. Testing Equipment for Transport Environment 2. Equipment for Technology Simulation, etc. **<Counterpart Training in Japan** 1. Testing for Transport Packaging 2. Post-harvest Treatment 3. Freshness Keeping Packaging (MAP) 4. Marketing, etc.	**<Counterparts>** ・Project Director (Undersecretary of DOST) ・Project Manager (Division Chief of DOST-PTD) ・PTD staff (27 pax) **<Facility and Existing Equipment>** ・Office space for experts ・Necessary facility for installation of equipment ・PTD's existing equipment **<Budget for Project Operation>** ・Operation and maintenance cost for facility and equipment, other operational cost ・Salary for Counterparts	PTD staff who is capacitated through the Project continues the job. **Pre-Conditions** The necessary staff, budget allocation and timely procurement of equipment are provided by PTD in preparation for the Project implementation. **Issues & countermeasures** - None.

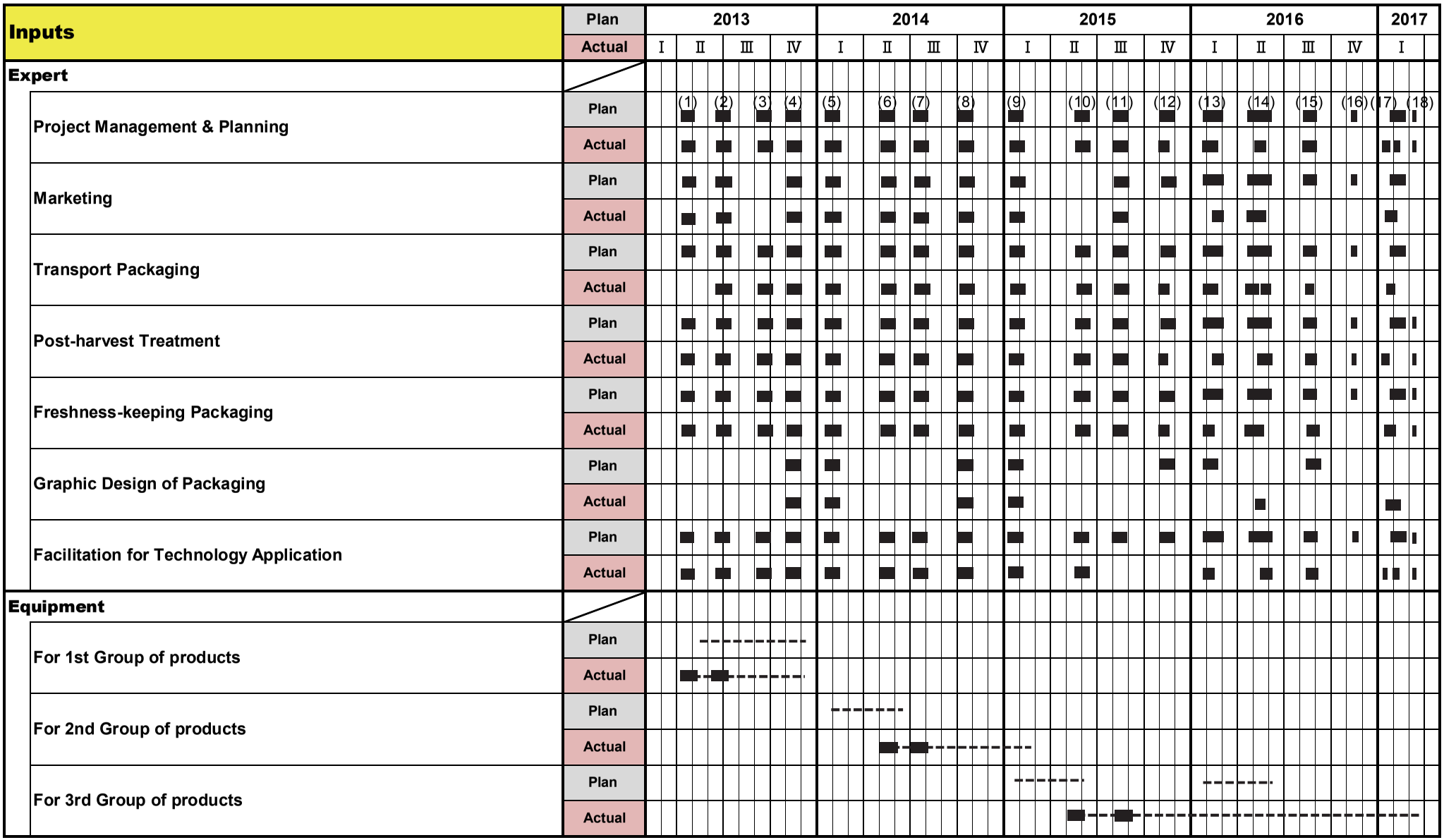
2-5 Develop the transport packaging technology to keep the freshness and reduce damage during handling and distribution for eight (8) target commodities in collaboration with TWGs and other relevant agencies. 2-6 Share with TWGs and the concerned organizations the lessons learned from the project activities. 3-1 Collect the necessary information upon the actual packaging technology utilization by the potential technology users. 3-2 Conduct the continuous technical support to technology users involved in Output 2 for the actual technology adoption. 3-3 Develop the training module/manual for the dissemination of the transport packaging technology of eight (8) target commodities, including the lessons learned through Activity 3-2. 3-4 Prepare the schedule for information dissemination of transport packaging with the module/manual through Activity 3-3. 3-5 Technology transfer and dissemination activities are conducted based on the plan and schedule of Activity 1-5 and 3-4. 3-6 Conduct the continuous consultation to technology users, with support of DOST Regional Offices and other relevant institutions, for the actual technology introduction.			

Annex 1-2

Plan of Operation

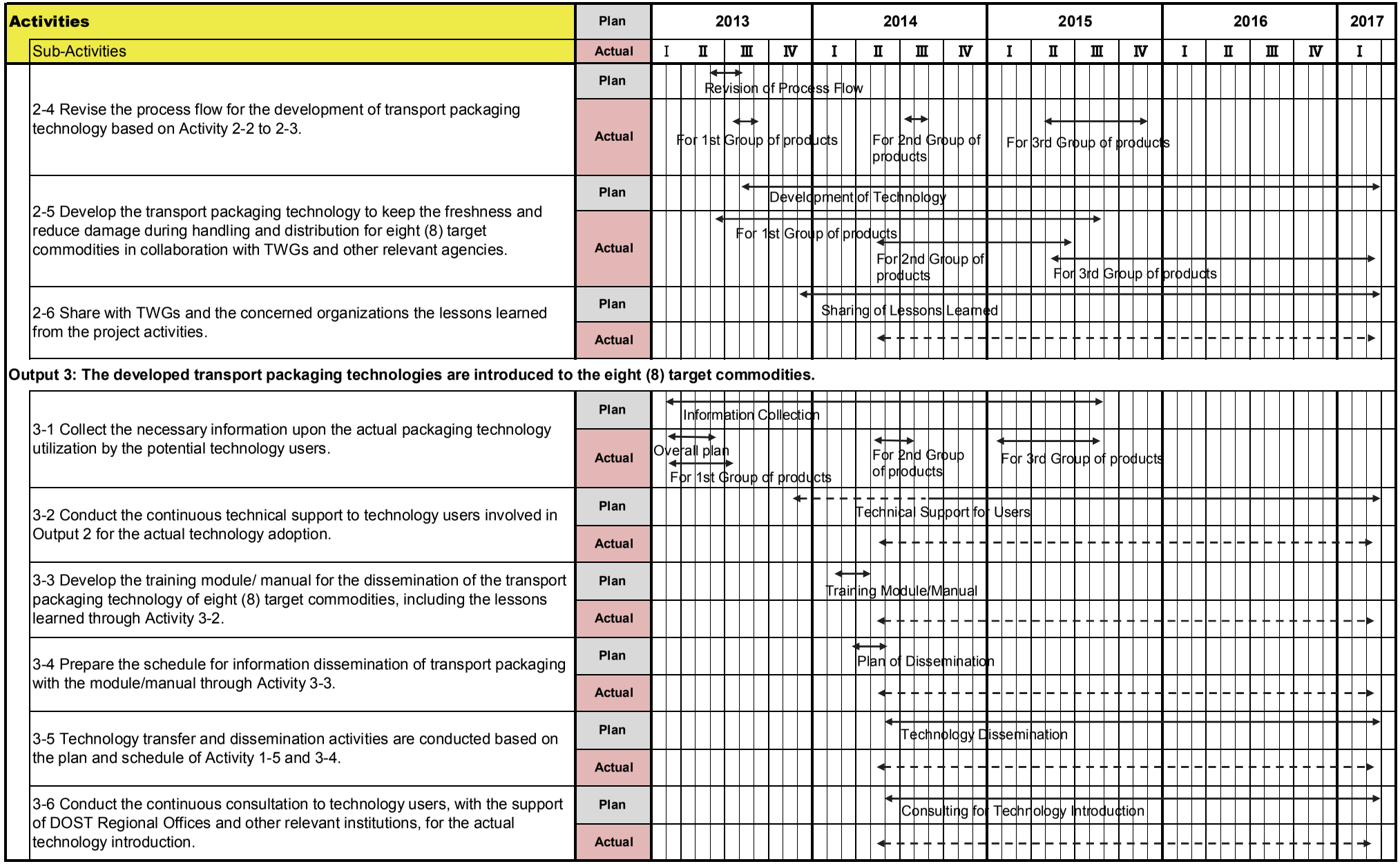
Annex 1-2: Plan of Operation

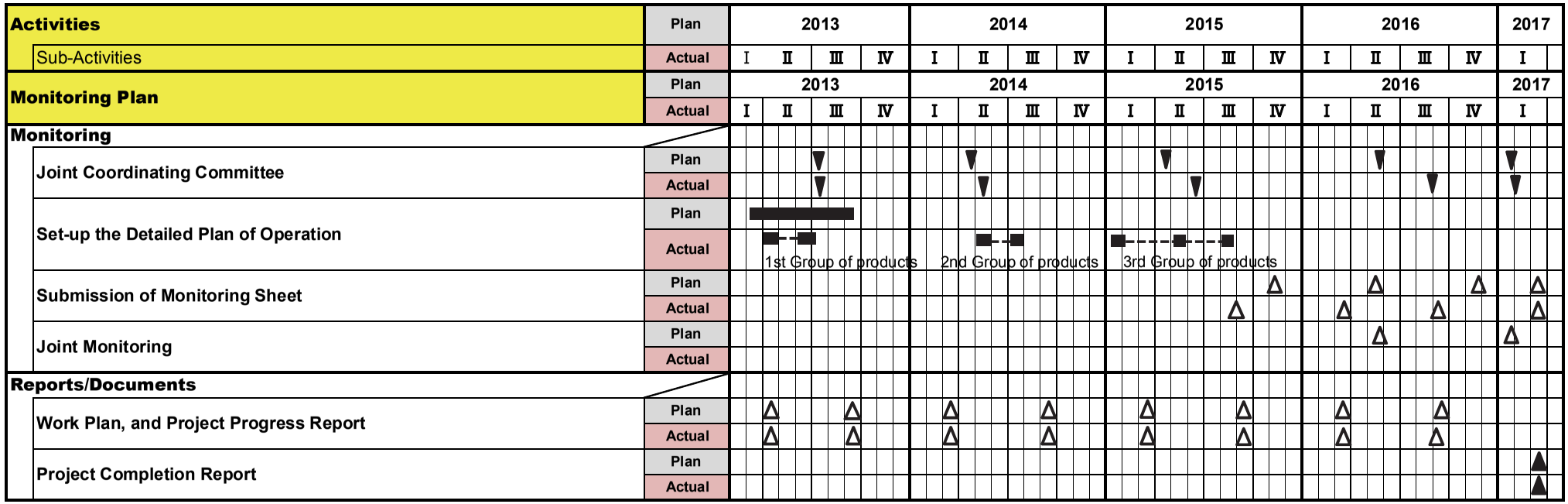
Project Title: Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Application of Appropriate and Sustainable Packaging Technology



Inputs	Plan/Actual	2013				2014				2015				2016				2017
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I
Training in Japan																		
Training for 1st year	Plan				■													
	Actual				■													
Training for 2nd year	Plan							■										
	Actual							■										
Training for 3rd and 4th year	Plan															■		
	Actual															■		

Activities	Plan	2013				2014				2015				2016				2017
Sub-Activities	Actual	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I
Output 1: An implementation process of technology development and introduction for eight (8) target commodities is finalized and the necessary planning and preparation are conducted.																		
1-1 Formulate the Project Activity Plan and Capacity Development Schedule for PTD staff to develop and introduce the transport packaging.	Plan	Plan				Modification of Plan (if necessary)												
	Actual																	
1-2 Discuss and identify the target sites from major production area and the beneficiaries according to eight (8) target commodities.	Plan	Identification of Sites & Stakeholders																
	Actual	Initial identification		For 1st Group of products			For 2nd Group of products			For 3rd Group of products								
1-3 Create the Technical Working Groups according to the target sites and/or developed technology, including the beneficiaries identified through Activity 1-2.	Plan	Identification of TWG members				TWG meetings												
	Actual	For 1st Group of products				For 2nd Group of products				For 3rd Group of products								
1-4 Formulate the Equipment Procurement Plan and purchase the necessary equipment based on the plan.	Plan	Plan		Introduce of Equipment														
	Actual	For 1st Group of products				For 2nd Group of products				For 3rd Group of products								
1-5 Formulate PTD's Technology Dissemination Plan for the relevant potential technology users, and institutions, which are expected to play supporting role in technology dissemination including DOST Regional Office.	Plan	Plan				Implementation												
	Actual					Implementation												
Output 2: Appropriate transport packaging technologies for eight (8) target commodities are developed.																		
2-1 Develop a process flow for the development of transport packaging technology.	Plan	Process Flow																
	Actual	Overall																
		For 1st Group of products				For 2nd Group of				For 3rd Group of products								
2-2 Conduct a survey to identify the needs for improvement of the current packaging of eight (8) target commodities and define the target of the improvement/ development.	Plan	Baseline Survey of Post-Harvest Loss																
	Actual	Initial survey on all the target products																
		For 1st Group of products				For 2nd Group of products				For 3rd Group of products								
2-3 Create the Technical Working Groups based on the Activity 1-3 and confirm the needs of improvement of transport packaging.	Plan	Create TWG																
	Actual	For 1st Group of products				For 2nd Group of products				For 3rd Group of products								


Activities
Sub-Activities
Plan
Actual
2013
2014
2015
2016
2017
I II III IV
2-4 Revise the process flow for the development of transport packaging technology based on Activity 2-2 to 2-3.
Revision of Process Flow
For 1st Group of products
For 2nd Group of products
For 3rd Group of products
2-5 Develop the transport packaging technology to keep the freshness and reduce damage during handling and distribution for eight (8) target commodities in collaboration with TWGs and other relevant agencies.
Development of Technology
For 1st Group of products
For 2nd Group of products
For 3rd Group of products
2-6 Share with TWGs and the concerned organizations the lessons learned from the project activities.
Sharing of Lessons Learned
Output 3: The developed transport packaging technologies are introduced to the eight (8) target commodities.
3-1 Collect the necessary information upon the actual packaging technology utilization by the potential technology users.
Information Collection
Overall plan
For 1st Group of products
For 2nd Group of products
For 3rd Group of products
3-2 Conduct the continuous technical support to technology users involved in Output 2 for the actual technology adoption.
Technical Support for Users
3-3 Develop the training module/ manual for the dissemination of the transport packaging technology of eight (8) target commodities, including the lessons learned through Activity 3-2.
Training Module/Manual
3-4 Prepare the schedule for information dissemination of transport packaging with the module/manual through Activity 3-3.
Plan of Dissemination
3-5 Technology transfer and dissemination activities are conducted based on the plan and schedule of Activity 1-5 and 3-4.
Technology Dissemination
3-6 Conduct the continuous consultation to technology users, with the support of DOST Regional Offices and other relevant institutions, for the actual technology introduction.
Consulting for Technology Introduction


Activities
Plan
2013
2014
2015
2016
2017
Sub-Activities
Actual
I II III IV I II III IV I II III IV I II III IV I
Monitoring Plan
Plan
2013
2014
2015
2016
2017
Actual
I II III IV I II III IV I II III IV I II III IV I
Monitoring
Joint Coordinating Committee
Plan
Actual
Set-up the Detailed Plan of Operation
Plan
Actual
1st Group of products
2nd Group of products
3rd Group of products
Submission of Monitoring Sheet
Plan
Actual
Joint Monitoring
Plan
Actual
Reports/Documents
Work Plan, and Project Progress Report
Plan
Actual
Project Completion Report
Plan
Actual

Annex 2

Revision of Project Design Matrix

Annex 2: Revision of Project Design Matrix (from Ver.0.0 to Ver.1.0)

(Approved in the 2nd JCC meeting)

[In the following, the words/sentences to be deleted are shown with a strike-through, while the words/sentences to be added are shown with underline.]

Project Title:

Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Application of Appropriate and Sustainable Packaging Technology

1 General

(1) C/P agency: Packaging Technology Division (PTD) of Department of Science and Technology (DOST)

(2) Project period: March 2013 to March 2017 (4 years)

(3) Target Site (major production area) & Commodity:

1)	CAR	Benguet	Broccoli
2)			Cauliflower
3)			Cut-flower (Roses)
4)			Cut-flower (Chrysanthemum)
5)	Region 3	Tarlac	Sweet potato
6)		Bataan	Smoked fish
7)	Region 11	Davao City	Durian
8)			Mangosteen

(4) Beneficiaries:

(a) farmers; (b) distributors (processing companies, wholesale distributors, logistics providers); and (c) retailors.

2 Overall Goal

Based on the know-how to develop the technology through the Project, the appropriate transport packaging technologies are developed and introduced for other fresh and semi-processed agricultural products.

Verifiable Indicator

1) Transport packaging developed at least for ~~X~~ 3 commodities aside from eight (8) target commodities covered by the Project

2) ~~Reduction rate of post-harvest losses for X commodities~~
(Approved to be deleted.)
Reason for the proposal: Verification of reduction rate requires intensive and costly baseline experiments per target commodity.

Means of Verification

- PTD~~'s Progress~~ Annual Report

3 Project Purpose

The post-harvest losses of eight (8) target commodities will be decreased through the introduction of appropriate transport packaging technology.

Verifiable Indicator

Reduction rate of post-harvest losses to be verified experimentally for the eight (8) target commodities

Means of Verification

- Project progress report
- ~~Monitoring report~~

4 Outputs

Output 1: An implementation process of technology development and introduction for eight (8) target commodities is finalized and the necessary planning and preparation are conducted.

Verifiable Indicator

Deliverables through Activity 1-1 to 1-5 are ready to be utilized

Means of Verification

- Project Implementation Plan
- Project progress report
- ~~Monitoring report~~

Output 2: Appropriate transport packaging technologies for eight (8) target commodities are developed.

Verifiable Indicator

The number of developed transport packaging for eight (8) target commodities

Means of Verification

- ~~Project Implementation Plan~~
- Project progress report
- ~~Monitoring report~~
- ~~Specification of transport packaging~~

Output 3: The developed transport packaging technologies are introduced to eight (8) target commodities.

Verifiable Indicator

The number of the technology users (inclusive of the concerned beneficiaries under Output 2)

Means of Verification

- Project progress report
- ~~Monitoring report~~
- ~~Dissemination plan of transport packaging technology~~
- ~~Survey and analytical information in major production sites~~
- Manual/Guideline for the packaging development and application

(3) Activities

For Output 1:

1-1: Formulate the Project Activity Plan and Capacity Development Schedule for PTD staff to develop and introduce the transport packaging.

1-2: Discuss and identify the target sites from major production areas and the beneficiaries according to eight (8) target commodities.

1-3: Create the Technical Working Groups according to the target sites and/or developed technology, including the beneficiaries identified through Activity 1-2.

1-4: Formulate the Equipment Procurement Plan and purchase the necessary equipment based on the plan.

1-5: Formulate PTD's Technology ~~Transfer~~ Dissemination Plan for the relevant potential technology users, and institutions, which are expected to play supporting role in technology dissemination including DOST Regional Offices. ~~and Satellite Toll Packaging Centers.~~

~~1-6:~~ ~~Revise the existing database as a tool to know the clients' needs and to manage the consultancy service records.~~

(Approved to be deleted. This has been conducted by PTD as a part of their own operation, and need no assistance under the current Project.)

For Output 2:

2-1: Develop a process flow for the development of transport packaging technology.

2-2 : Conduct a survey ~~on the situation of post-harvest losses~~ to identify the needs for improvement of the current packaging of eight (8) target commodities and ~~the collection of baseline data and specify how to measure the project indicator~~ define the target of the improvement/ development.

2-3: Create the Technical Working Groups based on the Activity 1-3 and confirm the needs of improvement of transport packaging ~~through the regular meetings~~.

2-4: Revise the process flow for the development of transport packaging technology based on Activity 2-2 to 2-3.

2-5: Develop the transport packaging technology to keep the freshness and reduce damage during handling and distribution for eight (8) target commodities in collaboration with Technical Working Groups and other relevant agencies.

2-6: Share with Technical Working Groups and the concerned organizations the

lessons learned from the project activities.

~~2-7:~~ ~~With regards to the beneficiaries who are engaged in the transport packaging development under Output 2, input the relevant information to the revised database by Activity 1-6, identify the needs and manage the consulting service record.~~

(Approved to be deleted due to the same reason as 1-6.)

For Output 3:

3-1: Collect the necessary information upon the actual packaging technology utilization by the potential technology users.

3-2: Conduct the continuous technical support to technology users involved in Output 2 ~~until~~ for the actual technology adoption.

3-3: Develop the training module/manual for the dissemination of the transport packaging technology of eight (8) target commodities, including the lessons learned through Activity 3-2.

3-4: Prepare the schedule for information dissemination of transport packaging with the module/manual through Activity 3-3.

3-5: Technology transfer and dissemination activities are conducted based on the plan and schedule of Activity 1-5 and 3-4.

3-6: Conduct the continuous consultation to technology users, with support of DOST Regional Offices and other relevant institutions, ~~Satellite Toll Packaging Centers until~~ for the actual technology introduction.

~~3-7:~~ ~~Input the information of technology beneficiaries except ones through Output 2, utilize it to know their needs and manage consulting service record.~~

(Approved to be deleted due to the same reason as 1-6.)

Annex 3

Achievement of Input

Annex 3: Achievement of Input

1. Achievement of Inputs - The Japanese Side

(1) Dispatch of Japanese Experts (in Man-months)

Expertise	Name	1st year	2nd year	3rd year	4th year	Total
1) Project Management & Planning	Tetsuo Inooka	2.67	1.73	2.47	2.23	9.10
2) Marketing	Miwako Oikawa	3.07	2.37	0.87	1.86	8.17
3) Transport Packaging	Toshihide Inada	3.40	2.70	2.40	2.50	11.00
4) Post-harvest Treatment	Takasuke Ishitani	3.53	3.03	2.43	2.57	11.56
5) Freshness-keeping Packaging	Hiroshi Osuga	3.86	3.03	2.53	2.54	11.96
6) Graphic Design of Packaging	Yoritoshi Yoshida	1.23	1.47	0.00	1.23	3.93
7) Facilitation for Technology Application	Yumi Balse	2.50	1.23	0.13	0.00	3.86
8) Facilitation for Technology Application (2)	Kaori Mori	0	0	0.47	2.23	2.70
Total		20.26	15.56	11.30	15.16	62.28

(2) Equipment

(See Annex 7)

(3) Training in Japan

(See Annex 5)

2. Achievement of Inputs-The Philippine Side

(1) Project Staff

1) Project Director: Ms. Daisy, Manager, PTD

2) Project Manager and Staff:

Group	Project Manager/Lead Person	Staff
Project management	Daisy	Josie, Pinky
Frozen durian	Pinky	Dane, Apul, Bimbo (Allan/Adonis) Dondon (transp. packaging), EJ (Graphic design)
Smoked fish	Cynthia	Grace, Daisy (Allan/Roger) Dondon (transp. packaging), Kevin (Graphic design)
Cut flowers	Joy	Daisy (Ricky/Adonis) Dondon (transp. packaging), EJ (Graphic design)
Sweet potato	Ermin	Joy, Daisy (Jolan) Kevin (Graphic design)
Broccoli & cauliflower	Eric	Joy, Angel, Daisy
Mangosteen	Grace	Eric, Dane
Transport packaging	Eric	Dondon, Ermin
Marketing	Marlut	Joy (cut flowers), Ermin (sweet potato) Eric (broccoli), Cynthia (smoked fish)

(2) Facility and Existing Equipment

1) Office space for experts, meeting space, and telephone and internet access line necessary for undertaking the Project are available for the JICA Project Team.

2) Necessary facilities for installation of equipment were prepared for the equipment installed.

(3) Budget for Project Operation

1) Operation and maintenance cost for facility and equipment, and other operational cost:
The counterpart funding for the current Project is being provided by the DOST through its Grant in Aid (GIA).

2) Salary for CPs:
All the project staffs are permanent personnel. The salary and other benefits provided under the Magna Carta for Science Workers are being provided by the National Government through its General Appropriation Act (GAA).

Annex 4

Record of JCC Meetings

MINUTES OF MEETING

Between Japan International Cooperation Agency
And Department of Science and Technology,
The Republic of the Philippines

On
First Joint Coordinating Committee
for
Technical Cooperation Project
on
"Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Application of Appropriate and Sustainable Packaging Technology"

The Department of Science and Technology (DOST) and Japan International Cooperation Agency (JICA) had the First Joint Coordinating Committee (JCC) Meeting chaired by Dr. Amelia P. Guevara DOST Undersecretary on July 16, 2013 for the purpose of approving the Project work plan and the activities to be conducted in the succeeding period until the next JCC meeting.

After thorough discussion on matters and issues as described in attachment 1, the JCC concluded the meeting as contained in attachment 1, and took note of the recommendations provided in the JCC as shown in attachment 1.

Manila, 23 May 2014

MR. NORIAKI NIWA
Chief Representative
Philippine Office
Japan International Cooperation Agency

DR. AMELIA P. GUEVARA
Undersecretary
Department of Science and Technology
Republic of the Philippines

Attachment 1

Highlights of the meeting

In the JCC meeting, the JICA Project Team Leader presented the proposed project Work Plan, progress of the Project implementation since it started in April 2013, and the proposed activity plan for year 1 (April 2013 until March 2014).

Conclusion

After the presentation and discussion the JCC has approved the following:

1. The progress which had been made by the end of the second fieldwork.
2. The project Work Plan proposed by the JICA Project Team, including:
   a. The first priority group of commodities to include frozen durian, and smoked fish.
   b. Organization of TWG per commodity per site.
3. The second JCC meeting is scheduled sometime in November 2013 instead of next year, considering that there are various matters to be discussed regarding the undertaking of the Project at the initial stage.

Recommendation

The JCC recommended the following activities to be undertaken and for presentation in the next JCC:

- Study the possibility of replacing some of the original target products taking into considerations the export potential and in view of the priority commodities on which all government agencies will focus toward 2015. (The JCC members will make recommendations on the possible commodities for consideration or inclusion until September 2013.)

Other matters discussed during the meeting

1. The dissemination of packaging technologies developed under the Project will be led by Philippine side. The DOST will assume the major or lead role in conducting the dissemination process through the TWG and DOST regional office.
2. The criteria of prioritizing the target products among the eight target products selected in the preparatory stage of the Project: the JICA Project Team explained that the major factors taken into account were: (1) seasonal availability of the commodity, (2) possibility to ensure the required equipment, (3) the progress of the relevant ongoing projects of the PTD, (4) readiness for organizing the Technical Working Group (TWG) at the target production site, and (5) road condition as in the case of cauliflower and broccoli of Benguet.
3. Intervention to improve the quality prior to packaging: In view of promoting export opportunities for target commodities, it was suggested that some products need Intervention to improve the quality prior to packaging. JICA Philippine Office responded that advising on the production process is clearly outside the scope of the Project. Nevertheless, the JICA Project Team will make recommendations, where possible, to facilitate discussion among TWG members who will be the ones to address the issues in the production process. PTD also explained that they can make reference to the DOST Regional Office for food safety issues.
4. Equipment necessary for packaging technology development under the Project: JICA Philippine Office asked the Philippine side that since the equipment is planned to be procured partly by JICA, and partly by DOST, both the Philippine side and the Japanese side should ensure the timely arrival of equipment so that the lack of equipment will not delay the Project.

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Attachment 2

LIST OF ATTENDANCE

(Philippine Side)

Department of Science and Technology (DOST)

Dr. Amelia P. Guevara	Undersecretary for Research and Development
Dr. Nuna E. Almanzor	Director, Industrial Technology Development Institute (ITDI)
Ms. Daisy E. Tañafranca	Chief Science Research Specialist, Packaging Technology Division (PTD), ITDI
Ms. Floridel Loberiano	Supervising Science Research Specialist, PTD, ITDI
Engr. Ericson Nolasco	Senior Science Research Specialist, PTD, ITDI
Ms. Ma. Lutgarda Angsanto	Science Research Analyst, PTD, ITDI

Department of Agriculture (DA)

Ms. Nemelita G. Sungcaya	Chief, Agribusiness Investment and Enterprise Development Division (AIEDD), Agribusiness and Marketing Assistance and Services (AMAS); and Representative for Engr. Leandro Gazmin, Director, AMAS
Mr. Takashi Fujimori	JICA Expert to DA-AMAS

(Japanese Side)

Japan International Cooperation Agency (JICA) Philippine Office

Mr. Takahiro Sasaki	Chief Representative
Ms. Sachiko Takeda	Senior Representative for Human Security Section (HSS)
Mr. Yoshiyuki Ueno	Chief and Representative, HSS
Mr. Ervin F. Mella, Jr.	Senior Program Officer, HSS
Ms. Judie Ann Militar	Program Officer, HSS

JICA Project Team

Mr. Tetsuo Inooka	Team Leader
Ms. Miwako Oikawa	Sub-Leader / Marketing
Mr. Toshihide Inada	Transport Packaging Technology
Mr. Hiroshi Osuga	Freshness-keeping Packaging
Ms. Yumi Balse	Facilitation for Packaging Technology Application

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MINUTES OF MEETING

Between Japan International Cooperation Agency
And Department of Science and Technology,
The Republic of the Philippines

On
Second Joint Coordinating Committee
for
Technical Cooperation Project
on
"Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Application of Appropriate and Sustainable Packaging Technology"

The Department of Science and Technology (DOST) and Japan International Cooperation Agency (JICA) had the Second Joint Coordinating Committee (JCC) Meeting chaired by Dr. Amelia P. Guevara, DOST Undersecretary, on May 23, 2014 for the purpose of acknowledging the progress of the project implementation and approving the Work Plan for the second year and the activities to be conducted in the succeeding period until the next JCC meeting.

After thorough discussion on matters and issues as described in attachment 1, the JCC concluded the meeting as contained in attachment 1, and took note of the recommendations provided in the JCC as shown in attachment 1.

Manila, 18 June 2015

(Original signed)

MR. TAKAHIRO MORITA
Senior Representative
JICA Philippine Office

(Original signed)

DR. AMELIA P. GUEVARA
Undersecretary
Department of Science and Technology
Republic of the Philippines

Attachment 1

Highlights of the meeting

Following the confirmation and signing of the minutes of meeting of the first JCC meeting, the JICA Project Team Leader presented the progress since the previous meeting and Work Plan for the second year of the Project.

Conclusion

After the presentation and discussion the JCC approved the following:

1. The progress which had been made since October 2013 and by February 15, 2014.
2. The Work Plan for the second year (from April 2014 to March 2015) proposed by the JICA Project Team, including:
    a. The second priority group of commodities to include sweet potato and chrysanthemum
    b. The second counterpart training in Japan to be conducted in late September to early October 2014
3. The third JCC meeting is scheduled sometime in October or November 2014.

Recommendation

The JCC recommended the following:

- The third priority group of commodities should be presented in the next meeting for approval of the JCC members.
- The revision of the Project Design Matrix (PDM) should be finalized and presented at the next JCC meeting. The overall goal and the project purpose cannot be changed.
- Updates on the packaging development should be communicated with the DOST regional offices.

Other matters discussed during the meeting

1. The JICA Project Team Leader reported that the PTD and JICA had agreed that the PTD would manage the consulting service database.
2. The JCC members acknowledged that the commodities currently in the third (rose and broccoli) and fourth (mangosteen and cauliflower) groups might be changed to other commodities if the assumed conditions would change. Rose will be replaced by another commodity since the PTD has already completed the packaging development under the DOST-GIA project.
3. The PTD Project Team Leader reported the highlights of the PTD's participation in FOODEX 2014. The initial packaging development for durian and sweet potato was exhibited. The results showed that durian had a good potential in Asian market including Japan, South Korea, Singapore, and China.

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Attachment 2

LIST OF ATTENDANCE

(Philippine Side)

Department of Science and Technology (DOST)

Dr. Amelia P. Guevara	Undersecretary for Research and Development
Dr. Nuna E. Almanzor	Director, Industrial Technology Development Institute (ITDI)
Ms. Daisy E. Tañafranca	Chief Science Research Specialist, Packaging Technology Division (PTD), ITDI
Ms. Floridel V. Loberiano	PTD, ITDI
Mr. Ericson T. Nolasco	PTD, ITDI
Ms. Ma. Lutgarda F. Angsanto	PTD, ITDI

Department of Agriculture (DA)

Ms. Nemelita G. Sungcaya	Agribusiness and Marketing Assistance and Services (AMAS)
Ms. Felicitas Macam	AMAS
Ms. Danica Cruz	AMAS
Ms. Flodelisa So	AMAS
Mr. Takashi Fujimori	JICA Expert, AMAS

National Economic and Development Authority (NEDA)

Mr. Raymond Paul G Pineda	Monitoring and Evaluation Staff

(Japanese Side)

Japan International Cooperation Agency (JICA) Philippine Office

Mr. Takahiro Morita	Senior Representative
Mr. Yoshiyuki Ueno	Section Chief, Human Security Group (HSG)
Ms. Kumiko Ogawa	Project Formulation Advisor, HSG
Ms. Judie Ann Militar	Program Officer, HSG

JICA Project Team

Mr. Tetsuo Inooka	Team Leader
Mr. Toshihide Inada	Transport Packaging Technology
Mr. Takasuke Ishitani	Post-harvest Treatment
Mr. Hiroshi Osuga	Freshness-keeping Packaging

MINUTES OF MEETING

Between Japan International Cooperation Agency
And Department of Science and Technology,
The Republic of the Philippines

On
Third Joint Coordinating Committee
for
Technical Cooperation Project
on
"Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Application of Appropriate and Sustainable Packaging Technology"

The Department of Science and Technology (DOST) and Japan International Cooperation Agency (JICA) had the Third Joint Coordinating Committee (JCC) Meeting chaired by Dr. Amelia P. Guevara, DOST Undersecretary, on June 18, 2015 for the purpose of acknowledging the progress of the project implementation and approving the activities to be conducted in the succeeding period until the next JCC meeting.

After thorough discussion on matters and issues as described in attachment 1, the JCC concluded the meeting as contained in attachment 1, and took note of the recommendations provided in the JCC as shown in attachment 1.

Manila, 29 July, 2016

田中 佑子

MS. YUKO TANAKA
Senior Representative
JICA Philippine Office

DR. AMELIA P. GUEVARA
Undersecretary
Department of Science and Technology
Republic of the Philippines

Attachment 1

Highlights of the meeting

Following were the major agenda in the meeting:

1. Confirmation and signing of the minutes of meeting of the second JCC meeting on May 23, 2014.
2. Report on the progress of the Project since the previous meeting by the JICA Project Team Leader.
3. Proposal on the revision of the R/D and Project Design Matrix (PDM) by the JICA Project Team Leader.
4. Proposal on the upcoming activities of the Project in the 3rd and 4th years, by the JICA Project Team Leader

Conclusion

After the presentation and discussion the JCC approved the following:

1. The progress which had been made since the last report to the 2nd JCC to the end of the 10th Fieldwork period on June 12, 2015
2. Revision of the R/D signed between JICA and DOST on December 10, 2012, for adoption of project monitoring every six (6) months in replace of conduct of the originally planned joint project evaluation by JICA and DOST
3. Revision of the original PDM (Version 0) agreed on December 10, 2012, between JICA and DOST, to that of Version 1 shown in Attachment 2
4. The work plan for the 3rd and 4th years as proposed by the JICA Project Team

Other matters discussed during the meeting

1. For vacuum packed ready to eat (RTE) smoked fish stored at ambient temperature, there is a major concern from the JCC members regarding the safety of the product considering this is a low-acid food PTD responded that they are currently monitoring the shelf life of the product.
2. With concerns on the additional cost for packaging materials used in conduct of package development, PTD will do cost benefit analysis for all the target commodities.
3. Frozen durian and semi-processed sweet potato will be featured in international food exhibits in Hong Kong, China in August and Osaka, Japan in October 2015. PTD is networking with DA-AMAS and CITEM for these exhibitions.
4. Frozen durian, sweet potato and smoked fish were given a citation award during the International Food Exhibition (IFEX) held in Manila last May 2015.
5. JICA shared that it has budget for PR and this can be used to promote the project's activities to the media through a media tour, press release, etc., to increase its visibility especially among packaging stakeholders.
6. PTD and Japanese teams reported that they have plans of package development for salad tomato and mango intended for export on the basis of technologies obtained through the Project, as their own project aside from the 8 target commodities
7. For mango, which is one of the proposed additional target commodity, Usec. Guevara is proposing PTD to inquire from PNRI-DOST the necessary disinfection of the fruits prior to exporting i.e. irradiation to prevent diseases like anthracnose.

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Attachment 2

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 1.0
Dated 18 June 2015

Project Title: **Project for Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Appropriate and Sustainable Packaging Technology in the Philippines**

CP Agency: DOST-PTD (Packaging Technology Division)

Target Site (major production area) & Commodity:

1) CAR (Benguet): ①Broccoli, ②Cauliflower, ③Cut-Flower (Roses), ④Cut-Flower (Chrysanthemum), 2) Region 3: ⑤ Sweet Potato (Tarlac), ⑥ Smoked Fish (Bataan);

3) Region-XI (Davao City) ⑦ Durian, ⑧ Mangosteen

Project Period: March 2013 – March 2017 (4 years)

Beneficiary: (a) Farmers, (b) Distributors (processing companies, wholesale distributors, logistic providers), (c) Retailers

Narrative Summary	Objectively Verifiable Indicator	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal: Based on the know-how to develop the technology through the Project, the appropriate transport packaging technologies are developed and introduced for other fresh and semi-processed agricultural products.	1. Transport packaging developed at least for three (3) commodities aside from eight (8) target commodities covered by the Project	- PTD Annual Report			

Project Purpose: The post-harvest losses of eight (8) target commodities will be decreased through the introduction of appropriate transport packaging technology.	Reduction rate of post-harvest losses to be verified experimentally for the eight (8) target commodities	- Project progress report	There is a need of transport packaging technology for other commodities.		

Narrative Summary	Objectively Verifiable Indicator	Means of Verification	Important Assumption	Achievement	Remarks
Outputs: 1. An implementation process of technology development and introduction for eight (8) target commodities is finalized and the necessary planning and preparation are conducted. 2. Appropriate transport packaging technologies for eight (8) target commodities are developed. 3. The developed transport packaging technologies are introduced to the eight (8) target commodities.	1-1 Deliverables through Activity 1-1 to 1-6 are ready to be utilized. 2-1 The number of developed transport packaging for eight (8) target commodities. 3-1 The number of the technology users (inclusive of the concerned beneficiaries under Output 2)	(1) - Project Implementation Plan - Project progress report (2) - Project progress report (3) - Project progress report - Manual / Guideline for the packaging development and application	The GOP policy in relation to packaging technology development is continued. Natural disaster and/or climate change do not affect the production of eight (8) target agricultural products.		

Activities	Inputs		Important Assumption
	The Japanese Side	**The Philippine Side**	
1-1 Formulate the Project Activity Plan and Capacity Development Schedule for PTD staff to develop and introduce the transport packaging. 1-2 Discuss and identify the target sites from major production area and the beneficiaries according to eight (8) target commodities. 1-3 Create the Technical Working Groups according to the target sites and/or developed technology, including the beneficiaries identified through Activity 1-2. 1-4 Formulate the Equipment Procurement Plan and purchase the necessary equipment based on the plan. 1-5 Formulate PTD's Technology Dissemination Plan for the relevant potential technology users, and institutions, which are expected to play supporting role in technology dissemination including DOST Regional Office. 2-1 Develop a process flow for the development of transport packaging technology. 2-2 Conduct a survey to identify the needs for improvement of the current packaging of eight (8) target commodities and define the target of the improvement / development. 2-3 Create the Technical Working Groups based on the Activity 1-3 and confirm the needs of improvement of transport packaging.	**<Japanese Experts>** 1 Project Manager 2 Transport Packaging Technology 3 Post-harvest Treatment 4 Freshness Keeping Packaging (MAP) 5 Marketing 6 Other experts with specific fields of technical expertise, as need arises **<Equipment>** 1. Testing Equipment for Transport Environment 2. Equipment for Technology Simulation, etc. **<Counterpart Training in Japan** 1. Testing for Transport Packaging 2. Post-harvest Treatment 3. Freshness Keeping Packaging (MAP) 4. Marketing, etc.	**<Counterparts>** ・Project Director (Undersecretary of DOST) ・Project Manager (Division Chief of DOST-PTD) ・PTD staff (27 pax) **<Facility and Existing Equipment>** ・Office space for experts ・Necessary facility for installation of equipment ・PTD's existing equipment **<Budget for Project Operation>** ・Operation and maintenance cost for facility and equipment, other operational cost ・Salary for Counterparts	PTD staff who is capacitated through the Project continues the job. **Pre-Conditions** The necessary staff, budget allocation and timely procurement of equipment are provided by PTD in preparation for the Project implementation. **Issues & countermeasures**

2-4 Revise the process flow for the development of transport packaging technology based on Activity 2-2 to 2-3. 2-5 Develop the transport packaging technology to keep the freshness and reduce damage during handling and distribution for eight (8) target commodities in collaboration with TWGs and other relevant agencies. 2-6 Share with TWGs and the concerned organizations the lessons learned from the project activities. 3-1 Collect the necessary information upon the actual packaging technology utilization by the potential technology users. 3-2 Conduct the continuous technical support to technology users involved in Output 2 for the actual technology adoption. 3-3 Develop the training module/manual for the dissemination of the transport packaging technology of eight (8) target commodities, including the lessons learned through Activity 3-2. 3-4 Prepare the schedule for information dissemination of transport packaging with the module/manual through Activity 3-3. 3-5 Technology transfer and dissemination activities are conducted based on the plan and schedule of Activity 1-5 and 3-4. 3-6 Conduct the continuous consultation to technology users, with support of DOST Regional Offices and other relevant institutions, for the actual technology introduction.			

Attachment 3

LIST OF ATTENDANCE

(Philippine Side)

Department of Science and Technology (DOST)

Dr. Amelia P. Guevara	Undersecretary for Research and Development, DOST and Project Director, JICA Project
Dr. Maria Patricia V. Azanza	Director, Industrial Technology Development Institute (ITDI)
Ms. Daisy E. Tañafranca	Chief Science Research Specialist, Packaging Technology Division (PTD), ITDI
Ms. Josefina L. Diaz	Supv. Science Research Specialist, PTD, ITDI
Ms. Floridel Loberiano	Supv. Science Research Specialist, PTD, ITDI
Engr. Ericson Nolasco	Senior Science Research Specialist, PTD, ITDI
Ms. Cynthia M. Bihis	Senior Science Research Specialist, PTD, ITDI
Engr. Ermin S. Orendain	Science Research Specialist II, PTD, ITDI
Ms. Ma. Lutgarda Angsanto	Science Research Analyst, PTD, ITDI

Department of Agriculture (DA)

Ms. Felicitas Macam	Chief, Agribusiness Investment and Enterprise Development Division (AIEDD), Agribusiness and Marketing Assistance and Services (AMAS); and Representative for Engr. Leandro Gazmin, Director, AMAS
Ms. Teresita Redondo	DA-AMAS
Mr. Takashi Fujimori	JICA Expert to DA-AMAS

(Japanese Side)

Japan International Cooperation Agency (JICA) Philippine Office

Mr. Takahiro Morita	Senior Representative JICA Philippine Office
Mr. Yoshiyuki Ueno	Section Chief, Human Security Group JICA Philippine Office
Ms. Kumiko Ogawa	Project Formulation Adviser, Human Security Group JICA Philippine Office
Ms. Judie Ann Militar	Senior Program Officer, Human Security Group JICA Philippine Office

JICA Project Team

Mr. Tetsuo Inooka	Team Leader

MINUTES OF MEETING

between
Japan International Cooperation Agency
and
Department of Science and Technology,
The Republic of the Philippines

On
Fourth Joint Coordinating Committee
for
Technical Cooperation Project
on
"Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Application of Appropriate and Sustainable Packaging Technology"

The Department of Science and Technology (DOST) and Japan International Cooperation Agency (JICA) had the Fourth Joint Coordinating Committee (JCC) Meeting chaired by Dr. Leah J. Buendia, Assistant Secretary on behalf of Dr. Rowena C. Guevara, DOST Undersecretary for R&D, on September 01, 2016 for the purpose of acknowledging the progress of the project implementation and approving the activities to be conducted in the succeeding period until the next JCC meeting.

After thorough discussion on matters and issues as described in attachment 1, the JCC concluded the meeting as contained in attachment 1, and took note of the recommendations provided in the JCC as shown in attachment 1.

Manila, February 03, 2017

MS. YUKO TANAKA
Senior Representative
JICA Philippine Office

DR. ROWENA CRISTINA L. GUEVARA
Undersecretary for R&D
Department of Science and Technology
Republic of the Philippines

Attachment 1

HIGHLIGHTS OF THE MEETING
(4th JCC conducted in September 01, 2016)

MAJOR AGENDA OF THE MEETING:

1. Report on the progress of the Project from the last report in June 2015 to August 31, 2016
2. Proposal of the Work Plan up to the end of the Project

CONCLUSION:

After the presentation and discussion, the JCC approved the following:

1. The progress which had been made since the last report to the 3rd JCC meeting to the end of the 15th fieldwork period on August 31, 2016
2. The Work Plan up to end of the Project on March 31, 2017 as proposed by the JICA Project Team

OTHER MATTERS DISCUSSED DURING THE MEETING:

1. From the Minutes of the 3rd JCC Meeting, PTD reported that PNRI-DOST does not have any study on the disinfection of fruits e.g. mango prior to exporting i.e. irradiation to prevent diseases like anthracnose.
2. PTD reported the various international and local food exhibitions they have participated to promote the fresh and frozen durian, sweet potato, and smoked fish in new packaging technologies.
3. JICA reported they could also help in the promotion of the commodities in new packaging technologies through a media tour, press release, and in some cases, participation in international food exhibitions.
4. The JCC members again reiterated their concern on the safety of smoked fish stored and distributed at ambient conditions. PTD and JICA teams acknowledged the concern and in the next meeting, the guidelines which include food safety concerns will be presented.
5. The PTD and JICA teams also acknowledged the recommendation to always specify the variety of sweet potato used in the study.

ATTENDANCE SHEET
5th JOINT COORDINATING COMMITTEE MEETING
February 03, 2017
Amihan Conference Room
PAGASA, Quezon City

NAME	DESIGNATION/OFFICE	SIGNATURE
Dr. Rowena Cristina L. Guevara	Undersecretary for R & D, DOST	
Ms. Yuko Tanaka	Senior Representative Human Security Group JICA Philippine Office	
Ms. Kumiko Ogawa	Project Formulation Adviser Human Security Group JICA Philippine Office	
Mr. Kessy Reyes	Senior Program Officer JICA Philippine Office	
Dr. Maria Patricia B. Azanza	Director, ITDI-DOST	
Mr. Tetsuo Inooka	Team Leader, JICA Project	
Ms. Miwako Oikawa	JICA Expert	
~~Ms. Kaori Mori~~	~~JICA Expert~~	
Ms. Gregoria Santos	DA-AMAS	
Ms. Edna Raguindin	DA-AMAS	
Ms. Daisy E. Tañafranca	Chief, PTD-ITDI-DOST & Project Leader, JICA Project	
Ms. Cynthia M. Bihis	PTD-ITDI-DOST	
Mr. Ericson T. Nolasco	PTD-ITDI-DOST	
Ms. Ma. Lutgarda F. Angsanto	PTD-ITDI-DOST	
Ms. Ma. Anya Yasmin Roslin	Office of Usec for R & D, DOST	

MINUTES OF MEETING

Between

Japan International Cooperation Agency

and

Department of Science and Technology
on
Fifth and Final Joint Coordinating Committee
for
Technical Cooperation Project
on

"Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Application of Appropriate and Sustainable Packaging Technology"

The Department of Science and Technology (DOST) and Japan International Cooperation Agency (JICA) had the 5th and Final Joint Coordinating Committee (JCC) Meeting chaired by Dr. Rowena Cristina L. Guevara, DOST Undersecretary for R & D, on February 3, 2017 for the purpose of acknowledging the progress of the project implementation and approving the activities to be conducted and expected accomplishment up to the end of the project on March 31, 2017.

After thorough discussion of matters and issues as described in attachment 1, the JCC concluded the meeting as contained in attachment 1, and took note of the recommendations provided in the JCC as shown in attachment 1.

Manila, February 17, 2017

MS. YUKO TANAKA
Senior Representative
JICA Philippine Office

DR. ROWENA CRISTINA L. GUEVARA
Undersecretary for R & D
Department of Science and Technology

Attachment 1

MINUTES OF MEETING
(5th and Final JCC Meeting conducted in February 3, 2017)

MAJOR AGENDA OF THE MEETING:

1. Confirmation and signing of Minutes of the 4th JCC Meeting last September 1, 2016
2. Report on the progress of the Project from the last report during the 4th JCC Meeting
3. Report on the expected accomplishment up to end of the Project on March 31, 2017

HIGHLIGHTS OF THE MEETING:

The 5th and Final JCC Meeting started at 8:15 a.m.

1. The meeting was chaired by Dr. Rowena Cristina Guevara, DOST Undersecretary for Research and Development.
2. Ms. Yuko Tanaka, Senior Representative of Human Security Group, JICA Philippines Office and Usec. Rowena Cristina Guevara confirmed and signed the previous Minutes of the 4th JCC Meeting last September 1, 2016.
3. Mr. Tetsuo Inooka, Team Leader of the JICA Project presented the report on the progress of the project from the last report during the 4th JCC Meeting and its expected accomplishment up to the end of the project this coming March 31, 2017.
4. Ms. Daisy Tañafranca, PTD Chief and Program Manager of the JICA Project emphasized that since this project handled fresh produce, weather condition was the "main enemy". She also cited some of the challenges experienced and overcame by the group during the project implementation. Ms. Tañafranca conveyed her gratitude for the continued support and assistance of the Japanese Government through JICA and the DOST Management from Phase 1 to Phase 2 of the project which provided PTD an opportunity to help the agricultural sector of this country.
5. Dr. Maria Patricia Azanza, ITDI Director, thanked JICA for bringing the post-harvest technology in enhancing the packaging technology and innovation capability of PTD. She also thanked DOST for the continued support to PTD.
6. On behalf of JICA, Ms. Yuko Tanaka expressed her appreciation to the effort of the project team and PTD in moving forward with the target despite the challenges of the country's weather and social condition. She encouraged the project team and PTD to continue moving forward with the remaining activities of the project and further disseminate packaging techniques and technologies. She asked DOST to sustain the achievement of the project in

promoting technology assistance to SMEs. She also extended gratitude to the long partnership with PTD-ITDI-DOST.

7. Usec. Rowena Cristina Guevara extended DOST's gratitude and appreciation to the Government of Japan for the assistance in improving the packaging technologies for Philippine products through the Phase 1 and Phase 2 JICA projects. She assured JICA that DOST is supporting the PTD as evidenced by the approval of the new project entitled "Upgrading and Enhancing the Capacity of the Packaging Technology Division in Packaging Research and Innovation". She thanked the Project Team for sharing their knowledge to PTD and for the gained friendship. She also thanked and congratulated PTD team for the job well done. Lastly, she emphasized that Japan is the strongest ally of the Philippines.

CONCLUSION:

After the presentation and discussion, the JCC approved the following:

1. The progress which had been made since the last report to the 4th JCC Meeting to the end of the 17th fieldwork period on January 31, 2017
2. The expected accomplishment of the project up to March 31, 2017 as presented by the JICA Project Team.

The meeting adjourned at 9:40 a.m.

Annex 5

Training Program in Japan

Annex 5: Training Program in Japan

1. 1st Training Program

(1) Training Period: October 15, 2013 to November 1, 2013 (18 days)

(2) Project Title: Improvement of transport packaging technology for agricultural products

(3) Participants (3 persons)

Name	Position	Organization (*)
Mr. Ericson Nolasco	Senior Science Research Specialist	PTD, ITDI, DOST
Mr. Fernan Victoria	Senior Science Research Specialist	PTD, ITDI, DOST
Mr. Ermin Orendain	Science Research Specialist II	PTD, ITDI, DOST

(*) Notes
PTD: Packaging Technology Division
ITDI: Industrial Technology Development Institute
DOST: Department of Science and Technology

(4) Program Objectives and Curriculum

Objective: Practical study and application of transport packaging technology in the distribution and post-harvest handling of agricultural and marine products

Curriculum	Curriculum objectives	Topics	Offices visited
(1) Packaging technology design	To learn the actual use and development of technologies related to design, evaluation and standardization of transportation packaging.	1) Corrugated cardboard industry in Japan 2) Carton box packaging design and production practice	· Rengo Co., Ltd. Packaging Engineering Department
		Latest information on packaging machines	· Japan Packaging Machines Exhibition
		Updates on various packaging-related technology information on products	· Oji Package Innovation Center Packaging Exhibition Area
(2) Post Harvest Processing and distribution	To learn the harvest, post-harvest treatment and distribution process of agricultural produce in Japan, with focus on the actual practice of using transportation packaging	Structure of agricultural cooperatives and role of direct sales shop of agricultural cooperatives	· Pocket Farm *Doki Doki*, Tsukuba-Ushiku store
		Sale and marketing structure of local products	· Roadside Station "Itako"
		Post-harvest processing and packaging of sweet potatoes at production site	· Namegata Agricultural Cooperative

Curriculum	Curriculum objectives	Topics	Offices visited
(2) Post Harvest Processing and distribution	To learn the harvest, post-harvest treatment and distribution process of agricultural produce in Japan, with focus on the actual practice of using transportation packaging	Distribution and packaging for the local market (fruit and vegetables, marine products and flowers)	· Tsuchiura Wholesale Market
		1) History and development of agriculture in Japan 2) Latest agricultural research and accomplishments	· Tsukuba Agriculture Research Hall
		Post-harvest processing of cut flowers at production site	· Kanou Rose garden
		Production and printing of cardboard boxes for individual packaging of agricultural products	· SEIKOU Co., Ltd. (Tsukuba factory)
		Post-harvest processing and packaging of vegetables at production site	· Farmers' Market in "Mizuho Village"
		1) Distribution and handling of vegetables and flowers 2) Exhibition methods of packaging at auction markets	· Ota Market
		Packaging, distribution and handling of marine products	· Tsukiji Market
		1) Packaging of fruits and vegetables and set-up of sales floor 2) Quality control standards for fruits and vegetables	· Matsuya Department Store · Ginza Mitsukoshi
(3) Role of transport packaging technology in public organizations	To learn the transportation packaging related services provided by public institutes in Japan	Analytical simulation to measure external force during transport of agricultural products and designing packaging containers (Method of measuring damage to agricultural products)	· National Agriculture and Food Research Organization
		1) Services related to transport packaging technology by public testing laboratories 2) Fundamentals and practical training on packaging design to absorb shock during cargo transport	· Technology Research Institute of Osaka Prefecture
		Role of public organizations on packaging technology	· Japan Food Packaging Association

2. 2nd Training Program

(1) Training Period: September 28, 2014 to October 18, 2014 (21days)

(2) Project Title: Packaging of fresh and semi-processed agricultural products for preservation of freshness in the post-harvest and distribution process

(3) Participants (3persons)

Name	Position	Organization (*)
Ms. Daisy E. Tañafranca	Chief Science Research Specialist	PTD, ITDI, DOST
Ms. Cynthia M. Bihis	Science Research Specialist II	PTD, ITDI, DOST
Ms. Mary Joy Paico	Science Research Analyst	PTD, ITDI, DOST

(*) Notes
PTD: Packaging Technology Division
ITDI: Industrial Technology Development Institute
DOST: Department of Science and Technology

(4) Program Objectives and Curriculum

Objective: Learn about agricultural products and food markets, focusing on flowers, smoked marine products, and fresh vegetables, as well as distribution and transport conditions / Packaging Technology to preserve freshness

Curriculum	Curriculum objectives	Topics	Offices visited
(1) Study on markets, distribution of flower, smoked fishery products and fresh vegetables in Japan, and transportation and freshness keeping packaging technologies related to these products	To learn the Flower market, distribution situation and learning packaging skills for transport / preserving freshness	Flower market, distribution conditions and packaging technology for transport / preserving freshness	· Aichi Prefecture Higashi Mikawa Agricultural Research Institute Flower Research Institute · Aichi Minami Agricultural Cooperative Association (Chrysanthemums Farmers) · Flower and Plant Research Institute · International Flower Expo
	To learn the upgrade of knowledge on distribution of smoked and similarly processed marine products	Learn about the market, distribution, packaging technology, and transport for smoked and similarly processed marine products to preserve freshness	· Komatsuya Foods Co., Ltd. · Soy sauce brewing company (Tsukudani raw material) · Tsukiji Market

Curriculum	Curriculum objectives	Topics	Offices visited
(1) Study on markets, distribution of flower, smoked fishery products and fresh vegetables in Japan, and transportation and freshness keeping packaging technologies related to these products	To learn the upgrade of knowledge on distribution of fresh vegetables	Learn about the distribution conditions, packaging technology, transport and preserving freshness of fresh vegetables	· Tsuchiura City Public Regional Wholesale Market · Tsukuba Agricultural Products Direct Sales Store · Farm visit (Tomato, broccoli, strawberry) · Ota Market · Senbiki-ya Head Office
(2) Recent trends of packaging technologies, materials and machines	To learn the upgrade of knowledge on packaging technology, materials, machinery and logistics	Information on the latest trends in packaging technology, materials and machinery	· Aichi Food Industry Technology Center · Tokyo Pack · Haneda Chrono Gate (Logistics Terminal) · National Food Research Institute

3. 3rd Training Program

(1) Training Period: September 20, 2016 to October 8, 2016 (19 days)

(2) Project Title: Packaging technology and post-harvest treatment for fresh and semi-processed agricultural products

(3) Participants (5 persons)

Name	Position	Organization (*)
Engr. Angel T. Basbasan, Jr.	Science Research Specialist II	PTD, ITDI, DOST
Ms. Sheryl H. Pesito	Science Research Specialist I	PTD, ITDI, DOST
Mr. Dane Archibald G. Balanon	Science Research Specialist I	PTD, ITDI, DOST
Mr. Darylle Jerome I. Ortiz	Science Research Analyst	PTD, ITDI, DOST
Mr. Kevin Joseph R. Dizon	Science Research Specialist II	PTD, ITDI, DOST

(*) Notes
PTD: Packaging Technology Division
ITDI: Industrial Technology Development Institute
DOST: Department of Science and Technology

(4) Program Objectives and Curriculum

Objective: Provide lectures and training on advanced cases in Japan pertaining to post-harvest processing, distribution process and packaging, and learn about the whole concept of R&D and technical assistance provided by private companies and public technical service organizations

Curriculum	Curriculum objectives	Topics	Offices visited
Learn some advanced cases on post-harvest processing, distribution process, and packaging, based on target products of the project.	To learn the advanced cases on post-harvest processing, distribution process, and packaging of fruits and vegetables	Actual distribution of agricultural products	· Tsuchiura Wholesale Market · Ota Market · Lotus Root Center of Tsuchiura Agricultural Cooperative · Imahashi Tourism Orchard
		Commercialization and packaging at the retail stage	· Supermarket Maruetsu Kachidoki · Nihonbashi Mitsukoshi Main Store (Basement Food Section) · Pocket Farm *Doki Doki* · Farmers' Market in "Mizuho Village" · Nihonbasi Toyama-Kan

Curriculum	Curriculum objectives	Topics	Offices visited
Learn some advanced cases on post-harvest processing, distribution process, and packaging, based on target products of the project.			· Lecture on " Tips on Development for Local Food Brand"
	To learn the private support services for post- harvest processing of fruits and vegetables, distribution process, and packaging	Packaging technology support provided by private entities	· SEIKOU Co., Ltd. (Tsukuba factory) · RENGO Co., Ltd. · Japan Packaging Institute · Tokyo Pack 2016 · Lecture on "Trends in new packaging technology"
		Packaging and distribution support provided by JA	· JA Agricultural Research and Development Center · Lecture on "Packaging and distribution of fruits and vegetables"
	To learn the ideal R & D technical support from public technical support organizations	Roles of public technical support organizations	· Food Research Institute of National Agriculture and Food Research Organization · Food Research Center of Aichi Center for Industry and Science Technology · Tsukuba Agriculture Research Hall
	To learn the packaging technology to promote regional brands	High value added agricultural products and regional branding and packaging	· Sorting Facility of grapes of JA Fruit Yamanashi · Katsunuma Budou no Oka ("Hill of grapes") · Katsunuma Winery of MANNS Wines · ASAYA Foods · Yamanashi Fruit Tree Experiment Station · Design Center of Yamanashi Industrial Technology Center
	Practical knowledge and skills on packaging graphic design	Product value appeal and packaging design technology	· Training on packaging graphic design

Annex 6

General Operating Expenses

Annex 6: General Operating Expenses

(Unit: Yen)

Particular		1st Year (FY2013)	2nd Year (FY2014)	3rd-4th year (FY2015-16)			Grand Total
				As of February, 2017 ①	Estimate for March, 2017 ②	Sub Total ①+②	
General operating expenses TOTAL		**1,622,498**	**1,245,308**	**3,783,980**	**307,600**	**4,091,580**	**6,959,386**
Travel & Transportation	Domestic air fare	255,187	86,936	143,000	0	143,000	485,123
Document preparation	Module and manual preparation expenses	0	0	0	160,600	160,600	160,600
Vehicle related expenses	Vehicle rental fees (*1)	1,251,030	994,879	2,034,328	57,000	2,091,328	4,337,237
Rental fees	Venue for Workshops (*2)	906	6,831	20,892	40,000	60,892	68,629
Miscellaneous expenses	Packaging material test production cost	92,667	58,033	1,157,531	0	1,157,531	1,308,231
	Procurement of sample agricultural products for experiment	22,708	81,074	428,229	50,000	478,229	582,011
	Venue for JCC (*3)	0	17,556	0	0	0	17,556
	Sub Total	115,375	156,662	1,585,760	50,000	1,635,760	1,907,798

(*1): The amount in FY 2013 was disbursed under "Rental fees"

(*2): The amounts in FY 2013 & FY 2014 were disbursed under "Miscellaneous expenses"

(*3): Venue for JCC in FY 2013 of 108,000 YEN was disbursed under "Conference fee" (other than General Operating Expenses), excluding the table above

Annex 7

Equipment Procurement

Annex 7: Equipment Procurement

Year	List	Qty	Arrival	Acceptance date(*)	Location	Person in Charge	Status of use
1st year	Hot water bath with temperature controller and circulator	1	13-Mar-2014	21-Mar-2014	Laboratory	Cynthia Bihis	Used for application test for processed food
	Vacuum packaging m/c (Nozzle type)	1	29-Jan-2014	21-Mar-2014	Laboratory	Floridel (Pinky) Loberiano	Used for making of film bags
	Quick freezing m/c	1	28-Jan-2014	21-Mar-2014	Pilot plant	Floridel (Pinky) Loberiano	Using to store packed durian
	Chest freezer	1	23-Dec-2013	21-Mar-2014	Pilot plant	Floridel (Pinky) Loberiano	Using to store sweet potato
	Potentiometer (Ultra compact : Temperature Data Loggers)	1	2-Sep-2013	18-Sep-2013	Staff room	Floridel (Pinky) Loberiano	Used for transportation test
	Refraction meter (1)	1	12-Sep-2013	21-Mar-2014	Library	Ermin Orendain	Used for sweetness measuring of sweet potato and fruit (Range: 0～20%)
	Refraction meter (2)	1	4-Sep-2013	18-Sep-2013	Library	Ermin Orendain	Used for sweetness measuring of sweet potato (Range: 0～33%)
	Refraction meter (3)	1	4-Sep-2013	18-Sep-2013	Laboratory	Cynthia Bihis	Used for salt content measuring of smoked fish and its seasoning mixture
	Refraction meter (4)	1	4-Sep-2013	18-Sep-2013	Library	Ermin Orendain	Used for sweetness measuring for curing of sweet potato (Measurement Range: Brix 0.0 to 53.0%)
	Simple ambient temperature and humidity meter	1	30-Aug-2013	18-Sep-2013	Library	Floridel (Pinky) Loberiano	Used for measuring of temperature and humidity for sweet potato, durian, etc.
	Oxygen Monitor (High functionality)	2	30-Aug-2013	18-Sep-2013	Staff room	Ray Anne Grace (Apple) Garalde	Used for respiration rate of sweet potato, broccoli, etc.
	Smell sensor	1	28-Aug-2013	18-Sep-2013	Laboratory	Floridel (Pinky) Loberiano	Used for odor measurement to verify the result of sensory test
	Distribution Environment Recorder	1	18-Sep-2013	18-Sep-2013	Library	Ericson (Eric) Nolasco	Used for packaging development simulation by measurement of external pressure during transportation
	ON/LLDPE film, PET/ON/LLDPE film, KON/LLDPE film, CN/LDPE	1	30-Aug-2013	18-Sep-2013	Library	Floridel (Pinky) Loberiano	Used for trail making of packaging for experiments of frozen durian and smoked fish
2nd year	Temperature controlled chamber with humidity control	2	3-Mar-2015	3-Mar-2015	Warehouse	Ermin Orendain	Used for experiments of cut flower and sweet potato, and respiration rate measurement
	Portable moisture analyzer for corrugated boards	1	20-Feb-2015	3-Mar-2015	Library	Ericson (Eric) Nolasco	Used for water content measurement of corrugated box of cut flower and sweet potato

Year	List	Qty	Arrival	Acceptance date(*)	Location	Person in Charge	Status of use
3rd year 1st batch	Color Meter	1	1-Mar-2016	4-Mar-2016	Laboratory	Sheryl H. Pesito	Used for color measurement of cut flower, fruit and vegetable
	Na-concentration measuring equipment (refractometer)	2	6-Feb-2016	4-Mar-2016	Laboratory	Cynthia Bihis	Used for adjustment of seasoning mixture for smoked fish
	Cabinet Type Dryer	1	10-May-2016	1-Jun-2016	Pilot plant	Cynthia Bihis	Used to reduce water content on processed fish
	Hardness meter (for fruit and vegetables)	1	16-Jan-2016	4-Mar-2016	Laboratory	Grace Noceja	Used for measuring hardness of fruits and vegetables
	Hardness meter (for rubber)	1	27-Jan-2016	4-Mar-2016	Laboratory	Grace Noceja	Used for measuring hardness of hard fruits and vegetables such as Mangosteen
	Impulse sealer	1	4-Feb-2016	4-Mar-2016	Laboratory	Cynthia Bihis	Used for making of film bags
3rd year 2nd batch	Coated aluminum foil bags	1	8-Aug-2016	18-Nov-2016	Laboratory	Dane Archibald Balanon	Used for experiment of frozen mangosteen
	PVDC coated nylon film bags	1	9-Aug-2016	18-Nov-2016	Laboratory	Floridel (Pinky) Loberiano	Used for application experiment of frozen durian (outer bag)
	Nylon-Polyethylene mixed film bags	1	8-Aug-2016	18-Nov-2016	Laboratory	Grace Noceja	Used for application experiment of frozen durian (inner bag)
	Absorb water sheets	1	9-Aug-2016	18-Nov-2016	Laboratory	Sheryl H. Pesito	Used for application experiment of fresh keeping of broccoli and so on.
	pH Meter	1	25-Oct-2016	18-Nov-2016	Laboratory	Dane Archibald Balanon	Used for application training of smoked fish for SMEs
	pH meter (for Sodium ion measurement)	1	28-Sep-2016	18-Nov-2016	Laboratory	Sheryl H. Pesito	Used for application training of smoked fish for SMEs
	Vacuum oven	1	23-Jan-2017	7-Mar-2017	Laboratory	Cynthia Bihis	Used for application training of smoked fish for SMEs
	Mackintosh computer	1	21-Oct-2016	18-Nov-2016	Graphic room	Kevin Joseph Dizon	Used for development of packaging graphic design
	Adobe	1	23-Nov-2016	6-Feb-2017	Graphic room	Kevin Joseph Dizon	Used for development of packaging graphic design
	Cable for shock meter	1	27-Sep-2016	18-Nov-2016	Laboratory	Ericson (Eric) Nolasco	Stored properly
	Steamer	1	18-Oct-2016	18-Nov-2016	Pilot plant	Cynthia Bihis	Used for application training of smoked fish for SMEs
	Smoker	1	18-Oct-2016	18-Nov-2016	Pilot plant	Cynthia Bihis	Used for application training of smoked fish for SMEs

(*): Date of Acceptance Letter

Annex 8-1

Record of Fieldwork

Annex 8-1-1: Record of the 2nd Fieldwork

Note: INO (Inooka), MI (Oikawa), IS (Ishitani), OH (Ohsuga), INA (Inada), YU (Balse)

Date			Common/ Admin.	Frozen Durian	Smoked Fish	Sweet Potato
6/16	Sun	am				
		pm	**MI, INA:** Arrival in Manila			
6/17	Mon	am	**INO, MI, YU, INA:** F2 schedule arrangement w/PTD			
		pm	**INA, MI:** Briefing by PTD on transp. package-related equipment in PTD			
6/18	Tue	am	**INA, MI:** Presentation by PTD on problems & issues related to distribution of fresh agricultural produce			
		pm	**INO, MI, YU:** Arrangement w/JICA for equipment procurement			
6/19	Wed	am	**INA:** (Presentation) Transport packaging containers for fresh produce			
		pm	**IS:** Arrival in Manila	**IS:** Meeting on patent application		
6/20	Thu	am				**IS,MI, INA:** Visit Root Crops Research and Training Center (Tarlac College of Agriculture) in Tarlac
		pm				
6/21	Fri	am	**INA:** (Presentation) Functional corrugated packaging			
		pm	**INO, MI, IS, INA, YU:** (Discussion) Training scheme, F2 schedule, Work Plan and equipment procurement			
6/22	Sat					
6/23	Sun		**OH:** Arrival in Manila			
6/24	Mon	am	**IS:** (Introductory Lecture) Food production, distribution and packaging for reducing post-harvest loss and increasing commodity value in the Philippines			
		pm				

Date			Common/ Admin.	Frozen Durian	Smoked Fish	Sweet Potato
6/25	Tue	am		**OH:** (Lecture) Field test and performance test of frozen food		
		pm				
6/26	Wed	am				
		pm				**IS, INA, OH, MI:** (Survey) Sweet potato production site in San Miguel Island, Tabaco, Albay
6/27	Thu	am				
		pm				
6/28	Fri	am	**INA:** (Introductory Lecture) Key points of package improvement (1)			
		pm				**IS:** (Preliminary discussion) Sweet potato production, distribution and packaging
6/29	Sat					
6/30	Sun					
7/1	Mon	am		**IS:** (Lecture & Instruction) Packaging and marketing of durian		
		pm		**OH:** (Lecture) Flavor-keeping packaging		
7/2	Tue	am		**OH, IS:** (Hands-on training/ trial) Flavor keeping packaging of durian (1)		
		pm				
7/3	Wed	am		**OH, IS:** (Hands-on training/ trial) Flavor keeping packaging of durian (2)		
		pm			**IS, OH:** (Preliminary discussion) Analysis of salt concentration level and Aw of smoked fish in the markets	
7/4	Thu	am		**OH:** (Hands-on training/ trial) Flavor keeping packaging of durian (3)	**IS:** (Lecture) Liquid food preservation	
		pm				**All members:** (Wrap-up discussion & instruction for the succeeding activities)
7/5	Fri	am				
		pm				
7/6	Sat					

Date			Common/ Admin.	Frozen Durian	Smoked Fish	Sweet Potato
7/7	Sun					
7/8	Mon	am		**OH:** (Hands-on training/ trial) Flavor keeping packaging of durian (4) **All members:** (Wrap-up discussion & instruction for the succeeding activities)		
		pm			**All members:** (Wrap-up discussion & instruction for the succeeding activities)	
7/9	Tue	am			**OH:** (Lecture) Pouch for boil-pasteurization	
		pm				
7/10	Wed	am	**INA:** (Introductory Lecture) Key points of package improvement (2) **IS:** Leaving for Japan			
		pm				
7/11	Thu	am	**INA:** (Lecture) Corrugated packaging design			
		pm				
7/12	Fri	am			**INA, OH, MI**: (Survey) Smoked fish manufacturer, Carmfoods, in Cavite	
		pm				
7/13	Sat					
7/14	Sun					
7/15	Mon	am		**OH**: (Hands-on training/ trial) Flavor keeping packaging of durian (5)		
		pm				
7/16	Tue	am	**JCC**			
		pm				
7/17	Wed	am	**All the remaining members:** Leaving for Japan			

Annex 8-1-2: Record of the 3rd Fieldwork

Date			Common/ Admin./Others	Frozen Durian		Smoked Fish	Sweet Potato	Cut Flower
			[f] film packaging **[t]** transport packaging	flavor-keeping packaging/ packaging for frozen product	transport packaging	**[p]** preserving shelf-life **[t]** transport packaging	preparation for AgriLink	
9/8	Sun	am						
		pm	**All the members:** Arrival in Manila					
9/9	Mon	am	Review/confirmation of needs and targets of packaging development of the respective target products; Presentation by PTD on the PTD's activities; consultation on the development methods, time schedules, and assignments (#)					
		pm		- Evaluation of the outcomes of the last sensory tests; Review and update of the research plan	- Installation and operation guidance of the Pick-up Sensor (whole day)			
9/10	Tue	am						
		pm	Follow-up meeting of the above (#)					
9/11	Wed	am	**[t] Lecture:** Basics of corrugated board packaging design (1) (*1)	(Preparation of materials & equipment for tests & trials)				
		pm	**[t]** Orientation for training program in Japan					
9/12	Thu	am		(Site visit to durian farm in Laguna)				
		pm	**[t] Lecture:** Basics of corrugated board packaging design (2)					
9/13	Fri	am					Preliminary meeting for preparation of research plan & schedule	
		pm	**[f] Lecture & trials:** Cause and countermeasures of wrinkles of the film packaging (to be continued)		- Planning and preparation of data gathering necessary for packaging design (to be continued)			
9/14	Sat							
9/15	Sun							

Date			Common/ Admin./Others	Frozen Durian		Smoked Fish	Sweet Potato	Cut Flower
			[f] film packaging **[t]** transport packaging	flavor-keeping packaging/ packaging for frozen product	transport packaging	**[p]** preserving shelf-life **[t]** transport packaging	preparation for AgriLink	
9/16	Mon	am					(Preparation for the site visit)	
		pm		(Delivery of durian at PTD)	(Trial package design for transport of fresh whole durian)			**[p][t]** Preliminary meeting for preparation of research plan
9/17	Tue	am		- Setup of flavor-keeping packaging tests (tests to be continued)	- Preparation of transport package of the fresh whole durian w/ dummy package for data gathering			
		pm						
9/18	Wed	am				**[p]** Meeting on concept and research plan for preserving shelf-life of smoked fish		
		pm	**[f] Lecture:** Basics of film packaging design (Orientation)(Lectures to be continued)					
9/19	Thu	am						
		pm	**[f] Trials:** Wrinkles of the film packaging (to be continued)		- Trial shipment of fresh whole durian from Davao w/ dummy package			
9/20	Fri	am		- Meeting w/ Mr. Lally on packaging development for the frozen durian	- Meeting w/ Mr. Lally on transport packaging development for the fresh whole durian			
		pm						
9/21	Sat							
9/22	Sun							

Date			Common/ Admin./Others	Frozen Durian		Smoked Fish	Sweet Potato	Cut Flower
			[f] film packaging **[t]** transport packaging	flavor-keeping packaging/ packaging for frozen product	transport packaging	**[p]** preserving shelf-life **[t]** transport packaging	preparation for AgriLink	
9/23	Mon	am						
		pm	**[f][t] Lecture:** Value adding of agricultural produce		Assessment & analysis of the data on the transport packaging of fresh whole durian			
9/24	Tue	am	**[p][t]** Preliminary meeting on packaging development for **tomato** for baseline data gathering					
		pm	**[f] Lecture:** MA Packaging of fresh products				Preparation for site visit in Tarlac	
9/25	Wed	am					(Site visit in Tarlac)	
		pm						
9/26	Thu	am					(Post-harvest treatment of sweet potato)	
		pm			- Plan on design of hand carrying box for frozen durian - Assessment of the modified transp. packaging design of the fresh whole durian			**[t]** Plan on design of transp. Packaging w/ displaying function
9/27	Fri	am						
		pm	Wrap-up meeting	Confirmation of the results of the sensory tests				
9/28	Sat		**All the members:** Leave for Japan					

Note: (*1) Continuation of the lectures on basics of the transport packaging in the last fieldwork period.

Annex 8-1-3: Record of the 4th Fieldwork

Date		General / Common	Durian			Cut-flower		Smoked Fish		Tomato
			Preserving / flavor-keeping packaging	Carrying box of frozen durian	Corrugated box for fresh & whole durian	Preservation of freshness	Transp packaging	Preservation of shelf life	Transp packaging	Preservation of freshness
11/3	Sun	Inooka, Ishitani, Balse: Arrive in Manila								
4	Mon	Confirmation & adjustment of outline of the work plan and work schedule								
5	Tue					Review of PTD's baseline survey				- Review of research theme on tomato by PCARRD
6	Wed		**[Lec.]** Packaging, labeling & marketing of frozen durian					Review of PTD's trial		
7	Thu									
8	Fri									
9	Sat									
10	Sun	Ohsuga, Inada: Arrive in Manila								
11	Mon		- Disc. on work plan	- Disc. on work plan (Confirmation of local availability of packaging materials)	- Disc. On work plan - Prep. for the fieldwork in Davao			- [Lec.] Aw control for QC and value adding - Disc. on work plan		
12	Tue	**[Lec.]** Damages of fruits & vegetables in the process of transportation, and consideration in package design **[Lec.]** MAP for freshness preserve of vegetables		- Prep. For the fieldwork in Davao		Disc. on work plan			- Disc. on work plan (Defining package development target)	
13	Wed	↑ Inooka, Ishitani, Ohsuga, Inada, Balse: Move to Davao	Orientation to TWG	Prototype development	Preparation of dummy package					
14	Thu	↑	Preparation & start of sensory tests @ Larry's Shop	↕	↕					
15	Fri	↑	1) Preparation & start of sensory tests 2) Countermeasures against wrinkles of frozen food packaging @ Rosario's fact.	↕	↕					

Date		General / Common	Durian			Cut-flower		Smoked Fish		Tomato
			Preserving / flavor-keeping packaging	Carrying box of frozen durian	Corrugated box for fresh & whole durian	Preservation of freshness	Transp packaging	Preservation of shelf life	Transp packaging	Preservation of freshness
11/16	Sat									
17	Sun									
18	Mon	(Transp. Package G. of PTD: Move to Davao)	←	→	Visit corrugated board mfr.					
19	Tue		Follow-up of the sensory tests	1) Disc. on prototype package incl. economics and marketability w/TWG 2) Data collection on carrying condition	Transport test					
20	Wed	All members: Move to Manila								
21	Thu		←	1) Review & redesign of package based on the disc at the site 2) Disc. on work plan for experiments on freshness preserving capacity	Evaluation of the transport test result & redesign of the package	Confirmation of progress of PTD's work				
22	Fri		Confirmation of shelf-life after thawing (#)		Laboratory test & re-prototyping					Disc. on the work plan
23	Sat	Ishitani: Leave for JPN								
24	Sun	Yoshida: Arrive in Manila								
25	Mon	Oikawa: Arrive in Manila		**[Hands-on]** Cold-keeping tests						
26	Tue	**[Lec.]** Review of graphic design works by PTD								
27	Wed	**[Lec.]** Strength design of corrugated box **[Mtg.]** National branding								
28	Thu	**[Hands-on]** Simple method of measuring respiration			**[Hands-on]** Drop test for shock and visible damage					
29	Fri	**[Lec.]** Basics of film packaging								
30	Sat									

Date		General / Common	Durian			Cut-flower		Smoked Fish		Tomato
			Preserving / flavor-keeping packaging	Carrying box of frozen durian	Corrugated box for fresh & whole durian	Preservation of freshness	Transp packaging	Preservation of shelf life	Transp packaging	Preservation of freshness
12/1	Sun									
2	Mon	**[Lec.]** Cushioning package design **[Lec.]** Review of graphic design works (cont.) **[Mtg.]** Marketing survey planning								
3	Tue	**[Lec.]** Basics of film packaging (cont.) **[Lec.]** Corporate identity guidelines			**[Hands-on]** Measuring respiration of durian after drop					
4	Wed	**[Lec.]** Basics of film packaging (cont.) **[Lec.]** Graphic design of transport packaging								
5	Thu	**[Lec.]** Graphic design of transport packaging (cont.)								
6	Fri	**[Lec.]** Basics of film packaging (cont.) **[Lec.]** Regional branding & concept planning **[Mtg.]** Wrap-up meeting								
7	Sat	Ohsuga, Inada: Leave for JPN								
8	Sun									
9	Mon	**[Mtg.]** Preparatory marketing survey **[Hands-on]** Graphic design of transport packaging for 5 priority products								
10	Tue	**[Lec.]** Graphic design of corrugated box packaging for sweet potato								
11	Wed	Yoshida, Oikawa: Leave for JPN								

Annex 8-1-4: Record of the 5th Fieldwork

Date		Common	Durian			Cut-flower, Sweet Potato & Tomato	Smoked Fish
			Preserving / flavor-keeping packaging	Transport packaging	Graphic design		
1/19	Sun						
20	Mon			Cold storage capacity of Styrofoam box and water-proof corrugated box for hand-carrying box of frozen durian			
21	Tue						
22	Wed	**Lec:** Design of buffer packaging (2)					
23	Thu			Example of hand carrying boxes			
24	Fri			Research on corrugated box for fresh & whole durian			
25	Sat						
26	Sun						
27	Mon		**10:00 Mtg:** Preparation for summary of packaging development for frozen durian (Review of the assignments)	**13:30 Lec:** Simulation of temperature of cooling box			Preparation for trial development of low-Aw products **13:30** Orientation
28	Tue		**11:00 Mtg:** Patent application of flavor-keeping packaging for frozen durian **13:30 Lec:** Evaluation of the sensory tests on durian	Continuation of research on cold storage capacity			
29	Wed		**Hands-on:** Verification of PVDC wrap brittleness		Finalization of package concept of durian		Preparatory trial
30	Thu		**10:00 Disc**: Findings on change in respiration of damaged durian				
31	Fri	**(Holiday)**	**(Holiday)**				
2/1	Sat						
2	Sun						
3	Mon				Preparation of dummy package for durian	**13:30 Disc:** Experimental design of respiration change after damage [Film & transp teams] **15:00 Mtg:** Planning for preliminary survey (in view of distributors and consumers) [Marketing team]	**9:30 Disc**: Follow-up on tsukudani trial [Smoked fish team] Preparation for trial development of low-Aw samples for preservation tests

Date		Common	Durian			Cut-flower, Sweet Potato & Tomato	Smoked Fish
			Preserving / flavor-keeping packaging	Transport packaging	Graphic design		
4	Tue	**Hands-on:** Design of buffer packaging (@ Kane Package) [Transp team] **Day1: 13:30-16:30** **Day2: 9:30-16:30**	**13:00 Disc:** Promotion plan of the packaging for durian [Durian team, transp team and graphic design team]			Preliminary survey **10:30 Disc**: Follow-up on experimental design of respiration change [Film team]	Needs assessment survey of transp packaging **15:00 Hands-on:** Sensory test on trial tsukudani samples
5	Wed						**9:30 Disc:** Summary of tsukudani trial [Smoked fish team]
6	Thu				Planning of promotion tools for durian		
7	Fri		**9:30 Disc**: Follow-up on sensory tests [Durian team]	**13:30 Mtg**: Wrap-up of 5th Fieldwork [Transp team]	**9:30 Mtg**: Wrap-up of 5th Fieldwork [Graphic team]	**13:30 Disc.** Experiment design for the respiration rate of fresh broccoli [Film team]	
8	Sat						
9	Sun						
10	Mon		Cost estimates of the developed packages (independent work)	Cold-keeping properties tests of frozen durian 50 pc. transport package / Cost estimates of the developed packages (independent work)	Perfection of graphic design for frozen and fresh durian / Cost estimates of the applied graphics (independent work)	**9:00 Hands-on**: Preparation for preliminary trial on broccoli respiration [Film team]	**13:30 Mtg**: Confirmation of agenda for visit to Carm's [Smoked fish team]
11	Tue					**15:00 Mtg:** Summary and next actions [Marketing team] **9:00 Hands-on**: Preliminary trial on broccoli respiration [Film team]	**9:00:** Preparatory visit to Carm's [Smoked fish team]
12	Wed					**9:00 Hands-on**: Preliminary trial on broccoli respiration [Film team]	Supplementary tests on low-Aw products
13	Thu					**9:00 Disc**: Report preparation of the preliminary trial on broccoli respiration [Film team]	
14	Fri	**9:30 Mtg**: Wrap-up for the 5th Fieldwork [Everyone]				**13:30 Disc**: Evaluation, review of experimental design, and planning for next tests [Film team]	
15	Sat						

Annex 8-1-5: Record of the 6th Fieldwork

Date		For a long shelf life and added value					For reduction of damages in post-harvest & distribution process				
		Frozen Durian	Smoked Fish	Vege-tables (*)	Cut Flower	Sweet Potato	Sweet Potato	(Buffer material)	Cut Flower	Frozen Durian	Smoked Fish
May 4	Sun										
5	Mon				**14:00-15:15: (Mtg)** Review of PTD's market survey results (cut flower, sweet potato & smoked fish),and planning of the supplementary surveys (Mi)						
6	Tue				**9:00 (Market survey)** Dangwa Flower Market (Mi)						
7	Wed					**11:00 (Market survey)** Dizon Farms (Mi)					
8	Thu					**Field trial (Tarlac)** Skin damage (Ermin & Joy)					
9	Fri	(14:00 Mtg. w/ JICA @ PTD)									
10	Sat										
May 11	Sun										
12	Mon	**9:30 (Mtg)** Program Orientation (Ino)				**10:30 (Mtg)** Review of PTD's trials (Maturing & improved post-harvest treatment) (Is, Ina)					
		15:00 Measurement of gas permeability of the target wrap films for the frozen durian (Oh)		**13:30 (Lec)** Basic factors for consideration for prolonged shelf life and added value of vegetables and flowers (Is)							
13	Tue	**10:00 (Hands-on)** Verification test of freeze tolerance of the target wrap films (Oh)				**10:30 (Lec)** Basic factors for prolonged shelf life and value added of sweet potato in harvesting, storage and transportation (Is)	**9:30 (Mtg)** Development of dummy box (Ina)				
			14:00 (Mtg) Planning of trials for prolonged shelf life of the new product (Is)			**11:15 (Mtg)** Planning of actual transportation test for gathering the baseline data on sweet potato (Ina)					
14	Wed		Preparation of samples for trials		**9:30 (Mtg)** Planning of actual transportation test for gathering the base data on cut flower (Ino, Is, Ina)	**10:00:** Planning of actual transportation test for sweet potato (2) (Ino, Is, Ina)					
				13:30 (Mtg) Planning of hands-on tests for confirmation of physiological actions of vegetables, including the review of the respiration rate confirmation test conducted (Oh)							
15	Thu			Preparation for the hands-on tests for physiological actions of vegetables						**14:00: (Lec)** Summary of conclusion on cold storage capacity of different packaging for frozen durian (Ina)	

Date		For a long shelf life and added value					For reduction of damages in post-harvest & distribution process				
		Frozen Durian	Smoked Fish	Vege-tables (*)	Cut Flower	Sweet Potato	Sweet Potato	(Buffer material)	Cut Flower	Frozen Durian	Smoked Fish
16	Fri										
17	Sat										
May 18	Sun										
19	Mon	**13:00 (Mtg.)** Discussion on the combination of wrap and pouch films for a long-term storage test (Oh)		Hands-on tests for confirmation of physiological actions of vegetables, including respiration, transpiration rate, and ethylene sensitivity (Oh)		**13:30 (Lec)** Actual practice of transp. packaging for cut flower (Ina)	**15:30 (Mtg.):** Prior discussion for performance measurement of cushioning materials (Ina)				
20	Tue		**AM:** Vacuum packaging of the target product samples for trial (Is)		**13:30 (Lec)** Review of MAP technology (Oh) **14:30 (Lec)** Basic factors to be considered for a long shelf life and added value of cut flowers (Is)						
21	Wed						**10:00 (Lec.):** Planning for Determination of performance of various cushioning materials (Ina)				
22	Thu								**7:00 (Site visit)** Unloading of cut flowers at the urban market in Manila (Is)		
23	Fri				**10:00 (mtg)** Planning of hands-on experiments for confirmation of physiological actions of cut flower(s), including respiration, transpiration rate, and ethylene sensitivity (Is, Oh)						
24	Sat										

Date		For a long shelf life and added value					For reduction of damages in post-harvest & distribution process				
		Frozen Durian	Smoked Fish	Vege-tables (*)	Cut Flower	Sweet Potato	Sweet Potato	(Buffer material)	Cut Flower	Frozen Durian	Smoked Fish
May 25	Sun										
26	Mon			Hands-on experiments for confirmation of physiological actions of cut flowers, including respiration, transpiration rate, and ethylene sensitivity (Oh)			**PM:** Hands-on training at a packaging company on cushioning materials (Ina)				
27	Tue				**PM: (Lec)** Use of chemical agents to keep shelf-life of cut flowers longer (Is)						
28	Wed		AM: Start of preservation trial test to determine the shelf life of the target product (Is)	Summary of the tests and preparation of the test report (Oh)							
29	Thu			**(Lec.)** How to design MAP (Oh)							**PM: (Mtg)** Planning of base-data gathering on damages of smoked/ dried fish in the transportation process, using the dummy box (Ina)
30	Fri	**10:00 (Mtg.)**: Wrap-up mtg. (Ino)									
31	Sat										

Note: (*) Including Broccoli, tomato, etc., as the basis of understanding the factors to be considered for fresh agricultural products.

Annex 8-1-6: Record of the 7th Fieldwork

Date		General	Common		Cut Flower		Sweet Potato		Smoked Fish	Durian
			Film Packaging (MAP for vegetables)	Transport Packaging	Film Packaging	Transport Packaging	Film Packaging	Transport Packaging		
7/9	Wed									
10	Thu			Confirmation of progress of dummy boxes and cushioning materials preparation						
11	Fri									
12	Sat									
13	Sun									
14	Mon	**10:00: [Mtg.]** Program Orientation (Inooka)							**14:00: [Mtg.]** Confirmation of progress of long-term storage tests (Ishitani) **15:00: [Mtg.]** Planning of actual transportation tests (Inada)	**13:30: [Mtg.]** Confirmation of progress of long-term freezing tests (Osuga)
15	Tue				**9:30: [Lecture]** Freshness-keeping agents (in general & for chrysanthemum); and R&D planning (Ishitani) **: [Mtg.]** Planning and preparation for site visit and actual transportation tests (Ishitani, Inada)					
16	Wed	(Office closed for typhoon)								
17	Thu		**9:30: [Lecture]** Recap of how to calculate the rate of respiration (Osuga)		**11:00: [Mtg.]** Planning for trial development and preliminary tests of freshness-keeping agents (Ishitani)					
18	Fri		**13:30: [Mtg.]** Preparation of the report of the broccoli tests in May (Osuga)		(Preparation of chemicals for trial development of freshness-keeping agents)	**9:30: [Lecture]** Actual practice in Japan (Inada)				

Date		General	Common		Cut Flower		Sweet Potato		Smoked Fish	Durian
			Film Packaging (MAP for vegetables)	Transport Packaging	Film Packaging	Transport Packaging	Film Packaging	Transport Packaging		
7/19	Sat									
20	Sun									
21	Mon		**13:30: [Lecture]** Summary of designing MAP for fresh produce (Osuga)					**9:30: [Mtg.]** Review of the last compression tests and vibration tests; and discussion on further R&D plan (Inada)		
22	Tue				**[Site Visit]** Move to Benguet					
23	Wed				**[Site Visit]** Interviews with growers, traders, consolidators, local government, etc.					
24	Thu	(S&T Week)			**[Site Visit]** Return to Manila **13:30: [Hands-on]** Trial development of freshness-keeping agents and preliminary tests to evaluate the effectiveness (Ishitani)					
25	Fri	(S&T Week)								
26	Sat	(S&T Week)								
27	Sun	(S&T Week)								
28	Mon	(S&T Week)		(Inspect delivered dummy boxes)	Continuation of preliminary tests to evaluate the effectiveness of chemical agents (Osuga)					
29	Tue	(Muslim Holiday)								
30	Wed				**10:00: [Mtg.]** Evaluation of the findings from the site visit to Benguet; and planning of preliminary field trial to be conducted by PTD (Ishitani) Continuation of preliminary tests to evaluate the effectiveness of chemical agents (Ishitani, Osuga)					
31	Thu		**10:00 [Mtg.]** Follow-up on the exercises on July 21 (Osuga)		Summarization of results (Ishitani)					
8/1	Fri	**10:00: [Mtg.]** Wrap-up meeting (Inooka)								
2	Sat									

Annex 8-1-7: Record of the 8th Fieldwork

Date		General	Common		Cut Flower		Sweet Potato		Smoked Fish	Durian
			Transport Packaging	Graphic Design	Film Packaging	Transport Packaging	Film Packaging	Transport Packaging		
10/19	Sun									
20	Mon		**13:30 [Mtg.]**: Confirmation of cushioning materials preparation / Inspection of the dummy box							
21	Tue		Preparation of cushioning materials					**13:30 [Lecture]**: Summary of causes of mechanical damages and planning for field trial	**10:00 [Mtg.]**: Planning for development of standard transport box	
22	Wed			**9:30 [Lecture]:** Graphic design of corrugated boxes (1)						
23	Thu			**9:30 [Lecture]**: Graphic design of corrugated boxes (2)					Preliminary research on individual packaging of smoked fish products sold at retail outlets and readily available packaging materials (Mr. Inada)	
24	Fri									
10/25	Sat									
26	Sun									
27	Mon	**10:00 [Mtg.]**: Program orientation	(Final inspection of the dummy box)		**13:30 [Mtg.]:** Review of the experiments conducted by the PTD and discussion on the research plan		**15:00 [Mtg.]:** Review of the experiments conducted by the PTD and discussion on the research plan			
28	Tue	**10:00 [Mtg.]**: Summary meeting of the 2nd Training Program in Japan (@ JICA Philippine Office)	**9:30 [Hands-on]:** Performance measurement of cushioning materials	**9:30 [Lecture]:** Graphic design of corrugated boxes (3) <to be confirmed>						
29	Wed				**[Site visit]:** Obtain samples from Tagaytay					
30	Thu			**9:30 [Lecture]:** Graphic design of corrugated boxes (3) or (4) <to be confirmed>	**9:30 [Lecture]:** Research plan **13:30 [Hands-on]:** Preparation of chemical mixtures			**15:30 [Mtg.]**: Plan for the field trial to be conducted in January	**13:30 [Mtg.]:** Plan for development of standard transportation packaging	
31	Fri			**13:30 [Lecture]:** Graphic design of corrugated boxes (4) <to be confirmed>	**9:30 [Hands-on]:** Labo tests on chemical use					

Date		General	Common		Cut Flower		Sweet Potato		Smoked Fish	Durian
			Transport Packaging	Graphic Design	Film Packaging	Transport Packaging	Film Packaging	Transport Packaging		
11/1	Sat									
2	Sun									
3	Mon	**13:30 [Mtg.]:** Discussion on next priority products					**9:30 [Lecture]:** Processing techniques for maximum sweetness			
4	Tue							**[Site Visit]:** TWG meeting in Tarlac discuss results of maturing trial and plan for actual transport test (no harvesting)		
5	Wed									(Preparation of the sensory tests)
6	Thu									**9:30 [Hands-on]:** Conclusion of the long-term storage tests **13:30 [Mtg.]:** Finalization of the Guideline
7	Fri						**9:30 [Hands-on]:** Trial processing to with saccharization techniques			
8	Sat									
9	Sun									
10	Mon								**9:30 [Hands-on]**: Conclusion of the long-term storage tests	
11	Tue								**[Site visit]:** Trial production in Batangus	
12	Wed									
13	Thu				**[Site visit]:** Obtain samples from Tagaytay					
14	Fri								**[Site visit]:** Meeting with a soy sauce company	
15	Sat									
16	Sun									
17	Mon									
18	Tue								**[Site Visit]:** TWG meeting in Bataan	
19	Wed	**[Site visit]:** Research on target products for the third year								
20	Thu									
21	Fri	**[Mtg.]:** Wrap-up meeting								
22	Sat									

Annex 8-1-8: Record of the 9th Fieldwork

Date		General	Common			Cut Flower (Chrysanthemum)		Sweet Potato	Smoked Fish		Durian	Tomato & Broccoli
			Transport Packaging	Graphic Design	Data collection for viability evaluation	Film Packaging	Transport Packaging		Film Packaging	Transport Packaging		
1/21	Wed											
22	Thu											
23	Fri			**13:30 [Mtg]:** Discussion on overall activity plan (Yoshida)								
1/24	Sat											
25	Sun											
26	Mon	**10:00: Orientation Meeting** (Briefing on the 9th fieldwork) (Inooka)	**14:30: Briefing by PTD** on data collection on cushioning performance after the last fieldwork period		**13:30 [Mtg]:** Plan for data collection for viability evaluation (Miwako) **14:00 [Mtg]:** Scenario for sweet potato (Miwako) **15:00[Mtg]:** Scenario for cut flower (Miwako)	**14:30: Briefing by PTD** on trials on freshness keeping agents after the last fieldwork period						
27	Tue			**13:00 [Lec]:** Regional branding and packaging design (Yoshida)	*Data collection in Metro-Manila (Miwako)*			**14:30 [Mtg]:** Confirmation and preparation for field trial (Inada)	**10:00: Review of past trials** in view of achievement of Control Points, and replanning of the trials in case of necessary (Ishitani)			
28	Wed		**13:00 [Site visit]:** Sanko Plastics Philippines Inc. (Inada, Ishitani, Osuga)		**13:30 [Mtg]:** Scenario for smoked fish (Miwako)		**9:30 [Mtg]:** Finalization of standard transp. package design for cut chrysanthemum (Inada)				**9:30: Sensory test** on flavor-keeping properties (Osuga)	
29	Thu	- (Afternoon) Move to Tarlac (Inooka, Inada, Miwako)		**13:30 [Lec]:** Graphic design of packaging for smoked fish (Yoshida)	**10:00 [Mtg]:** Scenario for durian (Miwako)	**9:30 [Lec]:** Required consideration on post harvest treatment of cut-flower harvested at the bud stage (Osuga)	*Fabrication of the standard transport box (Inada)*		**10:00 [Hands-on]:** Sensory tests on CP cleared & stored samples (Ishitani)			
30	Fri	*- Work in **Tarlac** (sweet potato)* *- Return to Manila*			**Field survey** for data collection in **Tarlac** (Miwako)			**Field trial in Tarlac**: Actual harvesting and transportation tests to improve mechanical damages (Inada)	**AM [Mtg]:** Planning for trial production at TESDA (Ishitani)			

Date		General	Common			Cut Flower (Chrysanthemum)		Sweet Potato	Smoked Fish		Durian	Tomato & Broccoli
			Transport Packaging	Graphic Design	Data collection for viability evaluation	Film Packaging	Transport Packaging		Film Packaging	Transport Packaging		
1/31	Sat											
1	Sun											
2	Mon	*- Move to Tagaytay (Ishitani, Osuga, Inada, Miwako)* *- Works in **Tagaytay** (cut flower)* *- Return to Manila*				**Field trial in Tagaytay:** Preparation and setting of trial of transportation at the bud stage (Osuga, Inada)						
3	Tue			**13:30 [Lec]:** Manipulation of 3D structural design data for effective graphic design (Yoshida)					**[Hands-on]:** Trial production at TESDA to prove processing standards (Ishitani)			
4	Wed	- (Late afternoon) Move to Davao (Osuga, Inada, Miwako)			*Data collection in Metro-Manila (cont.) (Miwako)*				**[Hands-on]:** Trial production at TESDA to prove processing standards (cont.)(Ishitani)	**9:30 [Mtg]:** Design of standardized transport packaging (Inada)		
5	Thu	*- Work in **Davao** (durian)* *- Return to Manila*		**10:00 [Lec]:** Graphic design of packaging for cut flower (Yoshida)	**Field survey in DAVAO** for data collection from durian farmers & processors (Miwako)				**[Hands-on]:**Sensory tests (Ishitani)	*Fabrication of the standard transport box (Inada)*	**9:00 TWG meeting in DAVAO**: Reporting of the results of packaging development (Osuga, Inada)	
6	Fri											
7	Sat											
8	Sun											
9	Mon				*Data collection in Metro-Manila (cont.) (Miwako)*	**13:30 [Mtg]:** Conclusion on research and development for cut flower (Chrysanthemum) - Use of chemical agents (Ishitani, Osuga) - Transport packaging (Inada)				*Fabrication of the standard transport box (Inada)*		
10	Tue			**13:30 [Lec]:** Regional branding and packaging design (cont.) (Yoshida)								

Date		General	Common			Cut Flower (Chrysanthemum)		Sweet Potato	Smoked Fish		Durian	Tomato & Broccoli
			Transport Packaging	Graphic Design	Data collection for viability evaluation	Film Packaging	Transport Packaging		Film Packaging	Transport Packaging		
11	Wed				**15:00 [Mtg]:** Interim discussion on viability of developed packaging technologies (Miwako)			**13:30 [Mtg]:** Conclusion on R&D to improve mechanical damages (Inada)	**10:00 [Mtg]:** Interim review on development of new products of smoked fish (Ishitani)			
12	Thu		**14:00 [Mtg]:** Interim review of ongoing cushioning performance tests (Inada)	**14:00 [Mtg]:** Wrap-up meeting with graphic design team (Yoshida)						**13:30 [Mtg]:** Interim review on standard box development (Inada)		**10:00 [Lec]:** Presentation of existing practice in Japan, suggestion of R&D themes, and discussion (Inooka, Ishitani, Osuga)
13	Fri	**10:00 [Mtg]:** Wrap-up meeting (Inooka)										

Annex 8-1-9: Record of the 10th Fieldwork

2015			Program		
			(Common)	(Broccoli & Cauliflower)	(Smoked fish, others)
5/24	Sun		- Arrival from Japan		
25	Mon	am	- Orientation meeting on the plan in the 3rd and 4th year and the current fieldwork		
				- Review of the trials on **broccoli** conducted by PTD, and initial discussion on package development plan for **broccoli & cauliflower**	
26	Tue	am			- Review of the trials on "**smoked fish**" conducted by PTD and discussion on the succeeding trial plan
		pm		- (Lec.) Packaging for **broccoli & cauliflower** in Japan (film and transport packaging)	
			(Report to JICA)		
27	Wed	pm			- Review of the responses from the potential package users of **durian** and disc. on the succeeding activities plan for promotion
28	Thu			- Move to Benguet - TWG meeting on **broccoli & cauliflower**	
29	Fri			- Field survey on **broccoli & cauliflower**; Return to Manila	
30	Sat				
31	Sun				
6/1	Mon				
2	Tue				
3	Wed	pm	(Lec. & preparation) Experiments to measure the shock absorbing capacity of cushioning materials		
4	Thu	am			- Discussion on supplementary experiment plan for **rose** (to be conducted by PTD after the 10th fieldwork period)
		pm		- Discussion on package development plan for **broccoli & cauliflower**	
5	Fri				
6	Sat				
7	Sun				
8	Mon		- Disc. on the plan in the next fieldwork; wrap-up meeting of the 10th fieldwork		
					- Review of the responses from the potential package users of **sweet potato** and disc. on the succeeding activities plan for promotion
9	Tue		- Preparation for JCC		
10	Wed				- Preparation for supplementary experiments of **rose**
11	Thu		(Report to JICA)		
12	Fri		- Leave for Japan		
17	Wed		- Arrival from Japan		
18	Thu		- 3rd JCC meeting		
19	Fri		- Leave for Japan		

Annex 8-1-10: Record of the 11th Fieldwork

Aug 2015			Program			
			(Common)	(Mangosteen)	(Tomato)	(Broccoli & Cauliflower, and others)
8/9	Sun		- Arrival from Japan			
10	Mon	am	- Move to Davao			
		pm		➲TWG meeting of mangosteen at DOST-XI, Davao		
11	Tue			➲ Visit of **Mangosteen** farms for survey on current practice & issues/ needs for package development, and for preparation of the 1st stage experiments		
12	Wed	am	- Return to Manila			
		pm		➲ Start of 1st Stage **Mangosteen** experiment to obtain the baseline data necessary for packaging design on re. freshness preservation		
13	Thu	am		➲ Disc. and confirmation on the 1st Stage **Mangosteen** experiment plan		
		pm				➲ Review of data obtained from the trials on **Rose** conducted by PTD
14	Fri			➲ Conduct of drop tests on **mangosteen** to obtain necessary data re. effects of physical impacts on mangosteen merchantability		
15	Sat					
16	Sun					
17	Mon	am		➲ Hearing survey on current practice & issues/ needs for package development of **Mangosteen** in Sulu from farm in Sulu province (@PTD) - Continuation of **Mangosteen** trials		
		pm			➲ Preparatory meeting of TWG meeting for **Tomato** in Benguet	➲ Review of trial results of **Rose** conducted by PTD before the current fieldwork period
18	Tue	am	- Move to Benguet		➲ Move to Benguet	
		pm			➲ TWG meeting for **Tomato** at Benguet	
19	Wed	am			➲ Visit farms of **Tomato** at Benguet	
		pm	- Return to Manila		➲ Move to Manila	
20	Thu		(Internal meeting)			
21	Fri		**(Holiday)** (Inooka, Inada to leave for JPN)			
22	Sat					
23	Sun					
24	Mon	pm				➲ Confirmation of preparation for on-site instruction on **Durian** application
25	Tue	am		➲Review of the 1 st stage experiments on **Mangosteen** and disc. and finalization on supplementary and the 2nd stage experiments		➲ Discussion on preparation for experiments on **Broccoli & Cauliflower**
26	Wed	am			➲ Finalization of preparation for experiments on **Tomato**	➲ Disc. and finalization on supplementary experiments on **Rose**
		pm	- **Wrap-up meeting** of the 11th fieldwork - Discussion on equipment			➲ Finalization of preparation for experiments on **Broccoli & Cauliflower**
27	Thu		(Miwako, Ishitani, Ohsuga to leave for JPN)			

Annex 8-1-11: Record of the 12th Fieldwork

Nov 2015			Program			
			(Common)	(**Broccoli & Cauliflower** & **Tomato**)	(**Mango**)	(**Mangosteen**, **Rose** and others)
11/2	Mon		- Preparatory meeting - Arrival from Japan (Ishitani, Ohsuga, Inada)			
3	Tue	am	- Orientation meeting	➲Preparation for provisional verification trials on freshness preservation of **Tomato**, using tomato available in the market		
		pm		➲ Start of provisional verification trials on freshness preservation of **Tomato**		➲ Review of the 1st Step experiments of **Mangosteen** conducted by PTD
4	Wed	am			➲ Preparation meeting for farm visit & hearing survey on **Mango**	
		pm		➲Preparation for provisional verification trials on freshness preservation of **Broccoli & Cauliflower**, using the produce available in the market Preparation for 1st Step experiments of **Broccoli & Cauliflower**		➲ Preparation for the fieldworks on **Transport Packaging**
5	Thu	am				
		pm				➲ Review of the results of experiments on **Rose** conducted by PTD
6	Fri					
7	Sat					
8	Sun					
9	Mon			➲ Start of provisional verification trials on freshness preservation of **Broccoli & Cauliflower**		
10	Tue					
11	Wed				➲ Organization of TWG meeting, farm visit & hearing survey on **Mango** (in Zambales)	
						➲ Meeting on **(Transport Packaging)**: - Design of transport packaging for trials for Tomato, Mangosteen, and Broccoli/Cauliflower - Experiments to define the capacities of cushioning materials available in the Philippines
12	Thu					➲ Start of experiments to define the capacities of cushioning materials available in the Philippines (**Transport Packaging**)
13	Fri					
14	Sat					
15	Sun					
16	Mon		- Wrap-up meeting of the 12th fieldwork			(To be continued by PTD)
17	Tue		Non-working day in NCR - All members left for Japan			

Annex 8-1-12: Record of the 13th Fieldwork

2016			Program			
			(Common)	(Broccoli & Cauliflower & Mango)	(Tomato)	(Mangosteen, Rose and others)
1/31	Sun		- Arrival from Japan (Oh, Ina)			
2/1	Mon	am	- Orientation meeting			
		pm		➲➲Preparation for sample procurement of Broccoli		
2	Tue			➲➲Sample procurement for freshness preservation and transport tests of Broccoli		
3	Wed			➲Freshness preservation tests of Broccoli ➲Observation of results of damage tests for transport packaging of Broccoli		
4	Thu					
5	Fri					
6	Sat					
7	Sun					
8	Mon					
9	Tue					
10	Wed				➲Preparation for sample procurement of Tomato	
11	Thu			➲Review of results of transport packaging tests of Broccoli		
12	Fri			➲Review of results of freshness preservation tests of Broccoli		
13	Sat		- Leave for Japan (Ka)			
14	Sun		- Arrival from Japan (Is)			
15	Mon		➲Review of results of cushioning capacity measurement of locally available materials		➲Final meeting on preparation of sample procurement of Tomato	
16	Tue			➲Preparation to establish criteria of sensory tests of freshness of Broccoli	➲Sample procurement for provisional freshness preservation tests of Tomato	

2016			Program			
			(Common)	(**Broccoli & Cauliflower** & **Mango**)	(**Tomato**)	(**Mangosteen**, **Rose** and others)
17	Wed				➲Sensory test for confirmation of consumer preference on Tomato in the Philippines	➲Sensory test for confirmation of shelf-life of smoked fish
18	Thu		- Arrival from Japan (Mi)	➲Discussion on provisional trials on Mango, and preparation for sample procurement		
19	Fri		- Instruction for use of refractometers			
20	Sat		- Leave for Japan (Oh, Ino)			
21	Sun					
22	Mon				➲Procurement and preparation of sample for freshness preservation tests of Tomato	
23	Tue				➲Sensory test	
24	Wed			➲Sensory test for establishment of criteria of freshness of Broccoli		
25	Thu		- Leave for Japan (Inada)			
26	Fri		- Lecture: Technical considerations on P-plus pouches			
27	Sat					
28	Sun					
29	Mon					
3/1	Tue					
2	Wed		- Wrap-up meeting	➲Manila=>Zambales		
3	Thu		- Leave for Japan (Mi)	➲Procurement of Mango; Zambales=>Manila		
4	Fri			➲ Sample preparation of Mango		
5	Sat		- Leave for Japan (Is)	➲Continued observation of Mango (freshness & maturity)	➲Continued observation of Tomato (freshness)	

Annex 8-1-13: Record of the 14th Fieldwork

2016		Program			
		(Common)	(**Broccoli & Cauliflower** & **Tomato**)	(**Mango**)	(**Mangosteen**, **Rose** and others) (No harvest of Mangosteen is assumed)
4/17	Sun	- JICA Team arrival from Japan			
18	Mon	- [PM] Orientation meeting	➲➲ Preparatory meeting to arrange for 2nd Step experiments of **Broccoli** (Preservation of freshness & transportation)		
19	Tue		➲➲ Preparation for 2nd Step experiments of **Broccoli** **[**AM] Sample procurement **in Manila** ➲ [PM] Sample preparation (Preservation of freshness) ➲ **[**PM] Pre-test measurement and box design (Transp.)		
20	Wed		➲ Measurement (day 1) ➲ [AM] Drop test		
21	Thu		➲ Measurement (day 2)		
22	Fri		➲ Measurement (day 3) ➲ [PM] Review of drop test results		➲ Preparatory meeting to arrange for re-verification test of **Rose**
23	Sat				
24	Sun				
25	Mon		➲ Measurement (day 4)		
26	Tue		➲➲ Preparation for 2nd Step supplementary experiments of **Broccoli** **[**AM] Sample procurement **in Manila** ➲ [PM] Sample preparation (Preservation of freshness) ➲ [PM] Pre-test measurement and box preparation		
27	Wed		➲ Measurement (day 1) ➲ [AM] Vibration test		
28	Thu		➲ Measurement (day 2) ➲➲ [PM] Review of the 2nd Step experiments and preparation for 3rd Step experiments of **Broccoli & Cauliflower** (Preservation of freshness & transportation)		
29	Fri		➲ Measurement (day 3) ➲ Preparation for actual transport test from **Benguet**		
30	Sat				
5/1	Sun	- Move from Manila to **Benguet**			
2	Mon	- Sample procurement in **Benguet**	➲➲ Preparation for 3rd Step experiments of **Broccoli** (Sample procurement **in Benguet**)		➲➲ Sample procurement of **Rose** **in Benguet** for re-verification test of freshness-keeping solution and transport test

2016		Program			
		(Common)	(**Broccoli & Cauliflower & Tomato**)	(**Mango**)	(**Mangosteen**, **Rose** and others) (No harvest of Mangosteen is assumed)
3	Tue	- Return from Benguet to Manila	➲➲ Preparation for 3rd Step experiments of **Broccoli** (Sample procurement **in Benguet**) ➲ Actual transport test from **Benguet** (Transp.)		➲➲ Sample procurement of **Rose in Benguet** ➲ Actual transport test of **Rose** from **Benguet** (Transp.)
4	Wed	(Broccoli and Rose samples arrived early in the morning)	➲ Preparation of samples (Preservation of freshness) ➲ Evaluation of actual transport test (measurement and data analysis)		➲ Sample preparation for re-verification test of **Rose** (Preservation of Freshness) ➲ Evaluation of actual transport test (Measurement and data analysis) of **Rose** (Transp.)
5	Thu		➲ Measurement (day 1)		➲ Measurement (day 1)
6	Fri		➲ Measurement (day 2)		➲ Measurement (day 2)
7	Sat		➲ Measurement (day 3)		➲ Measurement (day 3)
8	Sun				
9	**Mon**	Election Day			
10	Tue	**[Graphic design]** Preparatory meeting		➲➲ Sample procurement of **Mango in Zambales** for 2nd Step freshness preservation and transp. tests	
11	Wed	**[Graphic design]** Discussion on heirloom rice project	➲ Review of results from 3rd Step experiments	➲➲ Sample procurement of **Mango in Zambales** for 2nd Step freshness preservation and transp. tests	
12	Thu			➲ Sample preparation for freshness preservation tests of **Mango** ➲ Drop tests of **Mango**	
13	Fri	**[Graphic design]** Examples of regional branding for rice, coffee, and other agricultural products	➲ Summary of **Broccoli** experiments (Transp.)	➲ Preparation of PVA pouches for freshness preservation tests of **Mango**	➲ Review of results from actual transport test and plan for next experiments for **Rose** (Transp.)
14	Sat			➲ Sample preparation for freshness preservation tests of **Mango**	
15	Sun				
16	Mon	**[Graphic design]** Discussion on packaging development for street foods	➲ Summary of **Broccoli** experiments (Freshness preservation)		
17	Tue	- Move to Bataan and Tarlac			**TWG meeting** in Bataan (**Smoked fish**)
18	Wed	- Returned from Tarlac			**TWG meeting** in Tarlac (**Sweet potato**)
19	Thu				
20	Fri	**[Graphic design]** Examples of regional branding for rice, coffee, and other agricultural products			➲ Summary of **Rose** (Film)
21	Sat				

2016		Program			
		(Common)	(**Broccoli & Cauliflower & Tomato**)	(**Mango**)	(**Mangosteen**, **Rose** and others) (No harvest of Mangosteen is assumed)
22	Sun				
23	Mon				
24	Tue		➲➲ Sample procurement of **Tomato in Tagaytay** for 2nd & 3rd experiments for freshness preservation & transp.		
25	Wed		➲Start of 2nd & 3rd experiments for freshness preservation of **Tomato** ➲2nd & 3rd experiments for transp. (Drop test) of **Tomato**		
26	Thu	- Wrap-up meeting of the 14th Fieldwork	➲ vibration test of **Tomato**		
27	Fri				
28	Sat				
29	Sun				
30	Mon			➲ Sensory test	
31	Tue			➲ Measurement of respiration rate for MA package design, and measurement of transpiration amount for dew condensation	
6/1	Wed	- Discussion on procurement of equipment for 15th Fieldwork			➲ Discussion on preparation of training for **smoked fish** for SMEs considering available of measuring instruments
2	Thu		➲ Review of results of transportation test of **Tomato**		➲ Cushioning capacity measurement (5Kg)
3	Fri		➲ Review of progress of freshness preservation test of **Tomato**	➲ Review of progress of freshness preservation test of **Mango**, and discussion on next experiments	➲ Cushioning capacity measurement (10Kg)
4	Sat				
5	Sun				
6	Mon				
7	Tue				
8	Wed	- Completion of the fieldwork	➲ Continued observation of freshness preservation test of **Tomato**	➲ Continued observation of freshness preservation test of **Mango**	

Annex 8-1-14: Record of the 15th Fieldwork

2016		Program			
		Common and Others	**Broccoli & Cauliflower**	**Mango**	**Mangosteen**
8/14	Sun	- Arrival from Japan			
15	Mon	- Orientation meeting - Meeting for **Tomato & Mango** - Meeting for **Broccoli & Cauliflower**	- Work plan finalization for **Broccoli & Cauliflower** (Film & Transport)	- Work plan finalization for **Mango** (Film)	- Work plan finalization for **Mangosteen** (Film & Transp.)
16	Tue	- Measurement of efficiency of AWS - Distribution conditions of vegetables and fruits at a supermarket			
17	Wed	- AM: Meeting on DVO trip - AM: Measurement of respiration rate - PM: Report to JICA Philippine Office - PM: Procurement of Oxygen tank with regulator and carbide		- Measurement of volume of respiration of **Mango**	- Measurement of volume of respiration of **Mangosteen**
18	Thu	- Training on measurement of oxygen transmission rate of films - Meeting and preparation for the test to define end of marketability of agri products	- Procurement of sample in Pasig Market for initial trial of **Broccoli** and test of end of marketability of **Cauliflower**	- Procurement of sample for initial trial of **Mango** - Preparation of OPP film with AWS and start of initial trial of **Mango**	- Procurement of sample for test of end of marketability of **Mangosteen** in Pasig Market
19	Fri	- Meeting on **Frozen Mangosteen** - Training on measurement of oxygen transmission rate of films and measurement of packaging volume	- Initial trial of **Broccoli** - Test of end of marketability of **Cauliflower**	- Initial trial of **Mango**	- Test of end of marketability of **Mangosteen**
20	Sat				
21	Sun				
22	Mon	AM: Meeting on Smoke house PM: Meeting on procurement of equipment as final batch			
23	Tue	- Application trial of flavor-keeping package for Durian in Davao	- Procurement of sample **Cauliflower** in Taguig - Drop test and follow-up observation	- Procurement of sample **Mango** in supermarket - Test on MAP and WAS	- Preparation for Procurement of sample **Mangosteen** - Application of film and chemical treatment to prevent browning for **Frozen Mangosteen** in Davao
24	Wed				- Procurement of sample **Mangosteen**
25	Thu				- Conduct freshness keeping test, end of marketability test, and drop test on **Mangosteen**

2016		Program			
		Common and Others	**Broccoli & Cauliflower**	**Mango**	**Mangosteen**
26	Fri				
27	Sat				
28	Sun				
29	Mon				
30	Tue	- Schedule and preparation of training for application product and packaging of **Smoked Fish**		- Discussion on experimental plan of **Mango** for undertaking by PTD Team	
31	Wed	- Introduction lecture on measurement of respiration rate for transportation team	- Confirmation of experimental plan of **Broccoli & Cauliflower** for undertaking by PTD Team		
9/1	Thu	- 4th JCC meeting - Pre-orientation of Counterpart training in Japan		- After-ripening trial using Ethrel	- Discussion on findings from the experimental results of **Mangosteen**
2	Fri	- Wrap-up meeting			
3	Sat	- Return to Japan			

Annex 8-1-15: Record of the 16th Fieldwork

Nov 2016		Program					
		(Common)	(Broccoli & Cauliflower)	(Mango)	(Mangosteen)	(Smoked Fish)	(Graphic Design)
11/15	Tue	Arrival from Japan					
16	Mon					Preparation for final trial	
17	Tue					Trial for confirmation (Day 1)	
18	Wed					Trial for confirmation (Day 2)	
19	Thu						
20	Fri						
21	Sat					Trial for confirmation (Day 1)	
22	Sun					Trial for confirmation (Day 2)	
23	Mon	Leaving for Japan					

Annex 8-1-16: Record of the 17th Fieldwork

2017		Program					
		(Common)	(Broccoli & Cauliflower)	(Mango)	(Mangosteen)	(Smoked Fish)	(Graphic Design)
1/8	Sun						
9	Mon					Preparation for final trial	
10	Tue						
11	Wed						
12	Thu			Review of experimental result		Trial for confirmation (Day 1)	
13	Fri					Trial for confirmation (Day 2)	
14	Sat						
1/15	Sun	Arrival from Japan					
16	Mon	Orientation meeting 9:00	Review of experimental result (Freshness preserv.) 13:30 Review of experimental result (Transp.) 14:30		Review of experimental result (Freshness preserv.) 10:30 (transp.) 13:00		Orientation meeting 14:00
17	Tue		Review of experimental result (2) (Transp.) 10:00	Review of experimental result 13:30			
18	Wed		Summary meeting (Freshness preserv.) 13:30		Summary meeting 14:30	Final trial for confirmation (Day 1)	
19	Thu	(Summary lectures)	Summary meeting (Transp.) 10:00	Summary meeting 15:00		Final trial for confirmation (Day 2) Preparatory meeting 13:30	
20	Fri	- Basics of freshness preservation of vegetables and fruits and Design of MAP 10:00					Technical workshop for design team 13:30
21	Sat						
22	Sun						
23	Mon				Summary meeting 9:15		

2017		Program					
		(Common)	(Broccoli & Cauliflower)	(Mango)	(Mangosteen)	(Smoked Fish)	(Graphic Design)
24	Tue	- Moisture content and strength of corrugated board 10:00 **14:30 Preparation of sample boxes for compression tests**					Open lecture: Latest trends in packaging design for fresh produce 13:30
25	Wed	**10:00 Placement of test samples in chamber**				Trial production (w/ smoker vent open)	
26	Thu	- Characteristics of various packaging materials 10:00				Trial production (w/ smoker vent open) (2)	Technical workshop for design team 13:30
27	Fri	**10:00 Compression tests on conditioned sample boxes**					
28	Sat	Chinese New Year					
29	Sun						
30	Mon	- Design of buffer packaging (incl. use of locally available buffer materials) 10:00 - Moisture content and strength of corrugated board (cont.) 13:30				Sensory evaluation (1)	
31	Tue					Sensory evaluation (2)	
2/1	Wed					Trial production	Open lecture: Presentation of packaging design works for 7 target commodities (except durian) 13:30
2	Thu						
3	Fri	- Final JCC 8:00 @PAGASA					
4	Sat						
5	Sun						
6	Mon					(Prep. for training)	Technical workshop for design team 13:30
7	Tue					(Prep. for training)	
8	Wed					(Prep. for training)	
9	Thu						
10	Fri	Leaving for Japan					

Annex 8-2

Accomplishments and Next Activities at the End of Fieldwork

Annex 8-2-1:

Accomplishments and Next Activities at the End of the 3rd Fieldwork

Sep. 27, 2013

Lectures & hands-on trainings (1)

Category	Contents	Accomplish-ment	Plan for the next stage
Transp. Packaging	Basics of transp. packaging	Completed	Advanced course: 1) Strength design 2) Standards relating to transportation packaging (incl. ISO, ISTA, JIS, etc.)

Lectures & hands on trainings (2)

Category	Contents	Accomplish-ment	Plan for the next stage
Film Packaging	Basics of film packaging	Curriculum outline proposal	To be continued according to the needs of packaging development research plan of the respective target products
	Cause and counter-measures of wrinkles of the film packaging	Completed	To be continued with the topics based on the needs of packaging development research plan of the respective target products

Lectures & hands on trainings (3)

Category	Contents	Accomplish-ment	Plan for the next stage
Food packaging	Value adding of agricultural produce	Introductory	To be continued according to the needs of packaging development research plan of the respective target products
	MA Packaging for fresh agricultural produce	Introductory (concept & fundamentals)	To be continued according to the needs of packaging development research plan of the respective target products

Durian

Product	Frozen durian		Fresh durian
Objective of Pacakging development	Flavor keeping packaging	Carrying box	Transp. packaging of fresh whole durian
	Expansion of demand for durian in the national market, and for foregin visitors as a souvenior item		Export transp. of fresh whole durian
What have been done	Selection of suitable packaging film	Introduction of the possible packaging	First transp.test using the designed corrugated dummy box
Follow-up by PTD (aft. The current fieldwork period)	Summary report on the sensory tests	Information gathering on the packaging materials: Local availability, suppliers, price, and specifications, etc.	Modification of the packaging design (completed)
Next fieldwork	1) Application to the actual production 2) Evaluation in view of marketing	1) Trial design 2) Evaluation in view of marketing	1) Second transp. Test 2) Futher modification and labo-testing

Product	Smoked Fish	
	Preservation of shelf-life	**Transp. packaging development**
Objective of Pacakging development	Packging development which assumes distribution without cold storage	Reduction of damages on the product during the transportation
What have been done	Trial experiments to lower Aw at 70℃ without damaging the flavor, texture and tastes (in progress)	(None)
Follow-up by PTD (aft. The current fieldwork period)	Continuation of the above	Baseline survey on the current damage & loss of the product in the process of transportation
Next fieldwork	- Evaluation of the above experiments in view of marketing and food safety	1) Confirmation of the baseline data 2) Definition of the packaging development objective 3) Trial design of the corrugated board packaging

Product	Sweet Potato
Objective of Pacakging development	**Transport packaging development**
	Preparation for AgriLink
What have been done	Prparation of transp. packaging with display function at the retail shop
Follow-up by PTD (aft. the current fieldwork period)	1) Procurement of sweet potato of good quality to be harvested with appropriate harvest and post-harvest treatment 2) Study on the responses of the visitors on exhbition
Next fieldwork	(None)

Product	Cut Flower	
Objective of pacakging development	**Preservation of freshness**	**Transp. packaging development**
	(to be defined)	(to be defined, with objective in the current fieldwork period as the prepartion for the AgriLink)
What have been done	1) Initial discussion on packaging development objective. 2) Confrimation of the PTD's research results on the packaging development for freshness keeping of some cut-flowers	Discussion on the design of a corrugated box, for the AgriLink with function of display at the retail shop
Follow-up by PTD (aft. the current fieldwork period)	Baseline data gathering on the current situation in terms of freshness preservation (targetting rose)	1) Design and development of the corrugated box (for the AgriLink) 2) Baseline survey on the issues of transportation of cut-flower
Next fieldwork	1) Confirmation of the baseline data 2) Definition of the packaging development objective 3) Preparation of the research plan	1) Confirmation of the baseline data 2) Definition of the packaging development objective 2) Trial design of the corrugated board packaging

Product	Tomato
Objective of Pacakging development	**Preserving freshness**
	(To be defined)
What have been done	Introductory lecture on tomato packaging in Japan and other countries
Follow-up by PTD (aft. the current fieldwork period)	Confirmation of the research topics of tomato as a priority product under PCARRD(?)
Next fieldwork	1) Confirmation of the research topics 2) Definition of the packaging development objectives 3) Preparation of the packaging development research plan, incl. target production site and to-be TWG members to work with 4) Proposal to JCC-2 regarding inclusion of tomato as one of the target products

Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (1/9)

Product / objective of packaging development		Guidance and technology transfer during the 4th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item)	Develop flavor keeping packaging for the cut & frozen durian	- Identification of packaging materials good for flavor-keeping packaging - Guidance on the countermeasure against the wrinkles observed in vacuumed package - Initial guidance for application of the flavor-keeping packaging in the actual packaging process of manufacturers	- Summary of the sensory test results of the flavor-keeping packaging materials	- Economic study (*1) *(Study on the economics of the developed packaging)* - Guideline development (*2) *(Summary of the development process as the guideline for the future packaging development)*
	Develop carrying box of the frozen durian	- Analysis of cold storage capacity of the carrying box: 1) Styrofoam (to be continued) 2) Corrugated box	- Continuation of the analysis: 1) Styrofoam (with standard temperature of frozen durian) 2) Water-proof corrugated box 3) Use of substitute(s) of refrigerant - Survey on specifications of locally available Styrofoam for carrying box	- Summary of the development works based on the findings from the PTD's follow-up works - Economic study (*1) - Guideline development (*2)

Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (2/9)

Product / objective of packaging development		Guidance and technology transfer during the 4th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
	Development of graphic design for the above individual packaging & carrying box			
	Develop volume transport packaging of the frozen durian	- Analysis of cold storage capacity of Styrofoam container	- Continuation of the analysis on the water-proof corrugated box	- Summary of the development works based on the findings from the PTD's follow-up works - Economic study (*1) - Guideline development (*2)
	Support application of the developed packaging with proposal for value adding activities	- Sensory tests on consumers' preference on durian	- Preparation of a report summarizing the analysis of the data on the sensory tests on consumers' preference by variety	- Preparation for application of patent on the flavor-keeping packaging - Preparation of a survey to know the consumers' preference on durian
Development of export market of fresh whole durian		Development of export transport packaging for fresh whole durian	- Development of measuring method of respiration of fresh durian (to be continued)	- Confirmation of measuring method of respiration of fresh durian

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Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (3/9)

Product / objective of packaging development		Guidance and technology transfer during the 4th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Development of export market of fresh whole durian	Development of export transport packaging for fresh whole durian	- Design of corrugated box for transport of fresh whole durian (except for improvement of handling hole)		- Analysis of possible physiological damages of durian caused by external forces in the transport process, using the change in respiration

Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (4/9)

Product / objective of packaging development		Accomplishment	Follow-up by PTD after the current fieldwork	Next fieldwork
Smoked fish				
Reduction of transportation costs and expansion of markets	Packaging development (incl. product development, in case of necessary) which assumes distribution without cold storage	- Review of the trial experiments of PTD to lower Aw *(to be continued)* - (Lecture) Aw control for quality control and value adding	- Trial experiments to lower Aw at 70℃ without damaging the flavor, texture and tastes *(Continuation)*	- Evaluation of the PTD's trial results in view of marketing and food safety - Trial development of products applicable to boil pasteurization
	Reduction of damages of the product during the transportation	- Baseline survey on the current damage & loss of the product in the process of transportation		- Baseline survey on the current damage & loss of the product in the process of transportation 1) Confirmation of the baseline data 2) Definition of the packaging development objective

Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (5/9)

Product / objective of packaging development	Accomplishment	Follow-up by PTD after the current fieldwork	Next fieldwork
Cut flower			
Not defined yet	- Review of the results of the PTD's packaging development project - Initial proposal on the research plan for packaging development - Define the kind of target product, target production site for packaging development *(to be conducted in the next week)*	- Baseline survey to collect data and information to confirm the needs for the packaging development	- Define the objective of (or needs for) packaging development

Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (6/9)

Product / objective of packaging development	What have been done during the 4th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Other products			
Sweet potato & papaya for FOODEX 2014 (Frozen & fresh durian are also included as the target product for FOODEX)	- Guidance on development of graphic design for sweet potato (to be conducted in the next week)	(For all the target product items to be exhibited in FOODEX 2014) - Preparation of product planning sheet for the graphic design (by the end of December) - Development of 1st draft of graphic design (by early January) - Development of design concept of the exhibition booth (by mid of January)	(For FOODEX) - Development of the final (graphic) designs for the products to be exhibited - Development of the final (graphic) design of the booth (For brand development - - provisional) - Export brand development with graphic design of packaging for “Rice” - Regional brand development with graphic design of packaging for the major target products

Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (7/9)

Product / objective of packaging development	What have been done during the 4th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Sweet potato			- Market survey to collect data on actual practice in distribution of the sweet potato, and consumer/retailor preferences on variety, taste, size, unit volume, packaging, etc.
Vegetables	- Confirmation of the strategic priority of PCAARRD and their criteria for prioritization		- Preparation of packaging development plan for vegetables (for proposal for JCC)

Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (8/9)

Product / objective of packaging development	What have been done during the 4th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on packaging related technologies			
Basics on food packaging and post-harvest treatment			
Basics on packaging related to preservation of freshness / product life of agricultural products	- (Lectures) Potential and constraint of applying MAP technologies to fresh/cut vegetables and fruits - (Hands-on) Measurement of respiration of vegetables and fruits - (Hands-on) Test of respiration meter - (Lectures) Anti-fogging properties, aeration hole and P+ - (Lecture) Necessity of measuring the respiration of the products to identify the physiological damage of the products		- Preservation of freshness of food and their measurement
Basics on transportation packaging	- (Lecture) Strength design of corrugated box packaging - (Lecture) Basics of buffer packaging design *(to be continued)*		- (Lecture) Basics of buffer packaging design *(continued)*

Annex 8-2-2: Accomplishments and Next Activities at the End of the 4th Fieldwork (9/9)

Product / objective of packaging development	What have been done during the 4th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on graphic design of packaging	- Orientation to graphic design of packaging - Graphic design of packaging for brand development - Visual identity system (VIS) - Flexo printing technology		

Annex 8-2-3: Accomplishments and Next Activities at the End of the 5th Fieldwork (1/5)

Product / objective of packaging development		Guidance and technology transfer during the 5th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian (from Davao)				
Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]	Develop flavor keeping packaging for husked & frozen durian flesh	- Follow-up discussion on the summary report of the sensory tests on flavor-keeping properties - Verification of brittleness of PVDC wrap film for frozen durian	- Data gathering on the cost of developed packaging 1) Film, label, and other materials available in the Philippines 2) Markup rate of importers for films not available in the Philippines now 3) Costs of packages at Rosario's and Larry's	- Trial on replacement of PVDC wrap film - Economic study (*1) review - Guideline (*2) completion
	Develop carrying box of the frozen durian	- Conclusion of the cold-keeping properties tests: 1) Styrofoam box with sleeve handle 2) Corrugated box (with/without wax-coating)	- Cost estimation of the developed packaging: 1) Styrofoam box with sleeve handle 2) Wax-coated corrugated box 3) current carrying boxes (styrofoam) as comparison	- Economic study (*1) review - Guideline (*2) completion
	Develop graphic design for the above individual packaging & carrying box	- Graphic design samples: 1) Styrofoam carrying box with sleeve handle 2) Wax-coated corrugated carrying box 3) Label for individual package	- Perfection of the graphic design: 1) Communication of functional benefits of the packaging 2) Reflection of regional characteristics of the producing area 3) Communication of nutritional and other functional benefits of the fruit	

[1] Study on the economics of the developed packaging
[2] Summary of the development process as the guideline for the future packaging development

Annex 8-2-3: Accomplishments and Next Activities at the End of the 5th Fieldwork (2/5)

Product / objective of packaging development		Guidance and technology transfer during the 5th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
	Develop volume transport packaging of the frozen durian	- Tests on developed packages for 50 packs of packaged frozen durian to verify the cold-keeping properties 1) Wax-coated corrugated box 2) Corrugated box without wax-coating	- Cold-keeping properties tests (*continuation*) - Cost estimation of the developed packaging 1) Corrugated box 2) Wax-coated corrugated box 3) Existing styrofoam box as comparison - Study the cost, availability, and possible substitution of the cooling agent	- Economic study (*1) review - Guideline (*2) completion
	Support application of the developed packaging with proposal for value adding activities	- Preparation of patent application documents - Follow-up discussion on the summary report of the sensory tests for preference on variety - Survey on durian prices at supermarkets in Manila	- Finalization of the patent application documents and submission to TAPI - Long-term (up to 6 months) storage tests for flavor-keeping properties of double-packaging	- Follow-up on patent application - Long-term storage tests (*continuation*)
Development of export market of fresh whole durian	Develop export transport packaging for fresh whole durian	- Transport tests on hand-hole reinforcing boards for outer case - Development of individual inner packaging with a collapsible carrying handle	- Sample development and transport tests of reinforcing board made of corrugated fiberboard - Cost estimation of the developed packaging and existing packaging as comparison	- Economic study (*1) - Guideline (*2)

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Annex 8-2-3: Accomplishments and Next Activities at the End of the 5th Fieldwork (3/5)

Product / objective of packaging development		Guidance and technology transfer during the 5th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
	Develop graphic design for the above packaging	- Graphic design samples: 1) Inner 1-piece packaging 2) Outer 4-piece case	- Perfection of the graphic design: 1) Inner 1-piece packaging 2) Outer 4-piece case	
Smoked fish (from Calbayog)				
Reduction of transportation costs and expansion of markets	Packaging development (incl. product development, in case of necessary) which assumes distribution without cold storage	- Development of low-Aw fish product (smoked bangus *tsukudani*) that suggested marketing potentiality through sensory tests	- Long-term (up to 6 months) storage tests on the developed low-Aw product (smoked bangus *tsukudani*) 1) Without any further treatment after cooking and smoking drying 2) Vacuum-packaged and boil-pasteurized	- Long-term storage tests (*continuation*)
	Reduction of damages of the product during the transportation	- Needs assessment survey through interviews with producers, distributors/ consolidators, and retailors in Calbayog (*to be continued*) - Supplementary needs survey through interviews with retailors in Metro Manila (*to be continued*)	- Needs assessment survey through interviews with producers, distributors/ consolidators, and retailors in Calbayog (*continuation*) - Supplementary needs survey through interviews with retailors in Metro Manila (*continuation*)	- Define the objectives of transport packaging development

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Annex 8-2-3: Accomplishments and Next Activities at the End of the 5th Fieldwork (4/5)

Product / objective of packaging development	Guidance and technology transfer during the 5th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet)			
Not defined yet	- Needs assessment survey through interviews with dealers in Metro Manila		- Agree on the research and development plan - Preliminary trials
Other products			
Target product items to be exhibited in Foodex Japan 2014 1) Frozen and fresh durian 2) Sweet potato 3) Premium Food Philippines (mango, coconut, cacao, papaya, banana, pineapple, and pili nuts)	- Development of the graphic designs for packaging to be displayed - Dummy preparation of the graphic design for exhibition	- Perfection of the graphic design - Final presentation to CITEM - Realization/implementation of the planned packaging and display	
Sweet potato	- Needs assessment survey through interviews with dealers in Metro Manila		
Vegetables	- Experimental design and trial experiment on damage and respiration change (Broccoli)	- Experiments on damage and respiration change (Broccoli) - Needs assessment survey through interviews with dealers in Metro Manila (Tomato)	- Proposal to JCC

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Annex 8-2-3: Accomplishments and Next Activities at the End of the 5th Fieldwork (5/5)

Product / objective of packaging development	Guidance and technology transfer during the 5th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on packaging related technologies			
Basics on food packaging and post-harvest treatment			
Basics on packaging related to preservation of freshness / product life of agricultural products	- (Lecture) Damage evaluation of fresh fruits and vegetables		
Basics on transportation packaging	- (Lecture) Examples of hand-carry boxes - (Lecture) Simulation of temperature of cooling box - (Lecture) Cushioning package design - (Workshop) Practical exercise on cushioning package design		
Basics on graphic design of packaging	- (Lecture) Regional branding of agricultural products - (Lecture) Commercial packaging of Philippine durian and sweet potato - (Lecture) Techniques for package design renewal		

Annex 8-2-4: Accomplishments and Next Activities at the End of the 6th Fieldwork (1/5)

Product / objective of packaging development		What have been done during the 6th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]	Development of flavor keeping packaging for husked & frozen durian flesh	Trial on replacement of PVDC wrap film to overcome the brittleness in frozen conditions 1) Verification of permeability of the target films 2) Freezing test on brittleness	- Start of long-term freezing test with regular sensory tests	- Continuation of long-term freezing test
	Development of transport packaging for the frozen durian of flavor-keeping package	Summary of the research and trials on the frozen storage capacity tests of: 1) Carrying box of the frozen durian (of flavor-keeping packaging) 2) volume transport packaging for the frozen durian		- Guideline preparation for application
	Support application of the packaging developed with proposal for value adding activities		- Finalization of the patent application documents and submission to TAPI	- Follow-up on patent application
Development of export market of fresh whole durian	Develop export transport packaging for fresh whole durian	- Summary of the research and trials on the transport package with reinforcing board made of corrugated fiberboard		- Guideline preparation for application

Annex 8-2-4: Accomplishments and Next Activities at the End of the 6th Fieldwork (2/5)

Product / objective of packaging development		What have been done during the 6th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Smoked fish				
Reduction of transportation costs and expansion of markets	Package & product development, which assumes distribution without cold storage	- Finalization of the preparation process of low-Aw fish product - Planning of sample preparation for long-term shelf-life tests	- Preparation of samples for long-term shelf-life tests - Start of long-term shelf-life tests	
	Reduction of damages on the product during transportation	- Planning of the needs assessment/ baseline survey through actual transportation tests of the products (and using dummy box)		- Implementation of the actual transportation tests of the products - Needs assessment of the packaging development - Define the objectives of transport packaging development - Planning of the research and trials

Annex 8-2-4: Accomplishments and Next Activities at the End of the 6th Fieldwork (3/5)

Product / objective of packaging development		What have been done during the 6th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet)				
(Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process-- tentative)	Preservation of freshness and quality in the distribution process	- Needs assessment survey through interviews with dealers/ retailers in Metro Manila - Lecture on basic factors to be considered for preserving freshness of the cut-flower (Chrysanthemum) - Defining the research and development target for the Chrysanthemum: Preservation of freshness/ quality of the cut-flower using chemical agents		- Lectures on the chemical agents for extending freshness/ preserving quality of the cut-flower - Preparation of the research and development plan - Preliminary trials
	Preservation of freshness/ quality of the cut-flower in the transportation process with development of economically viable transport packaging--tentative	- Lectures on actual practice of transport packaging in Japan		- Planning & implementation of actual transportation test as a baseline study for the research and development, using Malaysianmum

Annex 8-2-4: Accomplishments and Next Activities at the End of the 6th Fieldwork (4/5)

Product / objective of packaging development	What have been done during the 6th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Sweet Potato			
Sweet potato	- Review of PTD's research & trials on sweet potato - Needs assessment survey through interviews with dealers in Metro Manila - Defining the research and development target for the sweet potato: Value adding with conduct of curing, maturing, (and recommendation on change in cooking method) (to be discussed)		- Defining the research and development plan
Reduction/ prevention of bruises on the surface during the post-harvest and transportation/ distribution process--tentative	- Confirmation of causes of bruises with compression test and vibration test - Defining the research and development target		- Defining the research and development plan

Annex 8-2-4: Accomplishments and Next Activities at the End of the 6th Fieldwork (5/5)

Product / objective of packaging development	What have been done during the 6th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on packaging related technologies			
Factors affecting the freshness and quality of the vegetables	- Lecture on factors affecting the freshness and quality of the vegetables - Measurement of physiological activities of vegetables to understand the factors - Lecture on design of MAP	- Preparation of the respiration measurement report	- Trial design of MAP
Cushioning package design	- Lecture and hands-on trials on cushioning package design - Preparation of standard dummy boxes		- Measurement of cushioning capacity of various materials available locally (for standard development and utilization)

Annex8-2-5: Accomplishments and Next Activities at the End of the 7th Fieldwork (1/6)

Product / objective of packaging development		What have been done during the 7th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]	Development of flavor keeping packaging for husked & frozen durian flesh	Follow-up on the long-term frozen storage test on flavor-keeping properties of target wrap film and pouch materials (Confirmed effectiveness of the replaced wrap film against brittleness under the frozen condition after one week of frozen storage)	- Continue long-term frozen storage test for up to 6 months (until November 2014)	- Sensory test to determine aroma leakage at frozen and ambient (thawed) temperatures - Use of smell sensor to confirm the above sensory test results. - Finalize the packaging development guideline
	Support application of the packaging developed with proposal for value adding activities		- Finalization of the patent application documents and submission to TAPI	- Follow-up on patent application

Annex8-2-5: Accomplishments and Next Activities at the End of the 7th Fieldwork (2/6)

Product / objective of packaging development		What have been done during the 7th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Smoked fish				
Reduction of transportation costs and expansion of markets	Package & product development, which assumes distribution without cold storage	- Confirmation of the product developed as sample for the long-term preservation test (shelf-life test)	- Continue long-term preservation test for up to 6 months (until November 2014)	- Verification of 6-month shelf life under ambient temperature - Improvement trial of marketability of the product (for lighter- colored product) - Sensory test by outside panel to validate the marketability of the product in the local market
	Reduction of damages on the product during transportation	- Discussed needs of transport packaging development for non-frozen smoked fish products (Conclusion: no development work of packaging for this objective)		- Development of transport packaging of the newly developed product if the need arises <u>Request from PTD</u> - Development of packaging (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging for the SMEs, appealing its economic viability

Annex8-2-5: Accomplishments and Next Activities at the End of the 7th Fieldwork (3/6)

Product / objective of packaging development		What have been done during the 7th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet)				
(Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process)	Preservation of freshness and quality in the distribution process (through use of freshness-preserving agents)	- Lecture on chemical agents for preserving freshness and enhancing quality of cut flowers (chrysanthemum) - Site visit to Benguet to assess the possibility of introducing pretreatment and chemical agents - Trial development of freshness-keeping agents with locally available ingredients - Research planning to verify effectiveness of use of freshness-preserving chemical agents in terms of kind and use timing	- Preliminary trials according to the planned research plan	- Review of the preliminary trials, and modification of the research plan if necessary - Plan and conduct of the modified research to define the kind and use timing of freshness- keeping agents

Annex8-2-5: Accomplishments and Next Activities at the End of the 7th Fieldwork (4/6)

Product / objective of packaging development		What have been done during the 7th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
	Preservation of freshness/ quality of the cut-flower in the transportation process with development of economically viable transport packaging	- Lecture on actual practice of transport packaging in Japan - Briefing on the PTD's project on cut flowers - Site visit to Benguet to identify key requirements for transport packaging	- Continue trial development (improvement) of transport packaging	- Review of the trials conducted, and modification of the development plan if necessary - Plan and conduct of the modified trials to finalize the development works
Sweet Potato				
Value adding through post-harvest treatments: curing and maturing			- Estimation of the cost of curing and maturing per unit volume (1 kg) of sweet potato - Estimation of the added value through consumer/panel evaluation	- Consolidation of the guideline

Annex8-2-5: Accomplishments and Next Activities at the End of the 7th Fieldwork (5/6)

Product / objective of packaging development	What have been done during the 7th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Reduction/ prevention of bruises on the surface during the post-harvest and transportation/ distribution process	- Summary of the results of compression and vibration tests conducted in the 6th Fieldwork (Finding: need for defining the points in harvesting, post-harvesting, and transporting process where the damages of the product has come out)		- Field observation/trial to confirm the harvesting, post-harvesting, and transporting point of cause of bruises and blemishes
Request from PTD: Improvement of post-harvest and transportation process of sweet potato for export promotion of semi-processed sweet potato (or, to attract importers/ buyers)			

Annex8-2-5: Accomplishments and Next Activities at the End of the 7th Fieldwork (6/6)

Product / objective of packaging development	What have been done during the 7th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on packaging related technologies			
Basics in designing MAP (To understand the factors to be considered in designing MAP, with exercises to define the factors quantitatively)	- Lecture on calculation of the respiration rate - Lecture on reporting of the analysis results (for broccoli trials) - Exercise to conclude the lectures and hands-on training programs on physiological activities of vegetables and their implication on the MAP design	- Preparation of the report of the series of trials on the respiration rate of broccoli	- Discussion, and improvement if necessary, of the prepared report
Cushioning package design	- Development of standard dummy box for (Delivery of the rework order delayed due to power outage following the typhoon)	- Collection and preparation of target cushioning materials to be measured for performance	- Measurement of cushioning capacity of various materials available locally (for standard development and utilization)

Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (1/9)

Product / objective of packaging development		What have been done during the 8th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]	Development of flavor keeping packaging for husked & frozen durian flesh	(Wrap film effective against brittleness under the frozen condition was already identified in the 7th Fieldwork) - Sensory test to determine smell leakage at frozen and ambient (thawed) temperature Findings & actions taken: 1) Incomplete smell cutoff-effect, due to leakage of smell from the twisted ends of the inner wrap 2) Start of retrial using pouched film for the inner package of vacuum	- Retrial of long-term frozen storage test for up to 2 months (until January 2015)	- Sensory test to determine smell leakage at frozen and ambient (thawed) temperatures - Finalize the packaging development guideline
	Support application of the package developed with proposal for value adding activities	- Review of the patent application documents (Not completed)	- Continuation of preparation of the patent application documents for application after confirming the above results	- Follow-up of the patent application

Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (2/9)

Product / objective of packaging development		What have been done during the 8th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Smoked fish				
Reduction of transportation costs and expansion of markets	Package & product development, which assumes distribution without cold storage *(See explanatory Note (*1) on Page 10, for further information)*	(In the 6th Fieldwork, the sample product for the long-term preservation test (shelf-life test) was developed at the laboratory level, but the volume is not sufficient for the long-term preservation test.) 1) Verification of long-term shelf life test under the ambient temperature: Need retrial with the target product 2) Improvement trial of marketability of the product (for lighter- colored product): Need further trials 3) TWG meeting in Bataan for possible application of the package & product to be developed	- Retrial of long-term shelf life test of the sample (prototype) which will be prepared according to the assumed conditions, for up to 6 months	- Sensory test by outside panel to validate the marketability of the product in the local market

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Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (3/9)

Product / objective of packaging development		What have been done during the 8th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
	Reduction of damages on the product during transportation <u>Request from PTD</u> - Development of packaging (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging for the SMEs, appealing its economic viability	- Collected some samples of smoked fish, which are distributed in the markets, to define the specification of the standard package		- Design of standard package

Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (4/9)

Product / objective of packaging development		What have been done during the 8th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet – Tagaytay as an alternative site of cut-chrysanthemum for obtaining samples for laboratory tests)				
(Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process)	Preservation of freshness and quality in the distribution process (through use of freshness-preserving agents)	1) Review of the preliminary trials, which were conducted by PTD, and modification of the research plan 2) Site visit to Tagaytay to obtain sample cut-chrysanthemum 3) Conduct of the modified research trials to define the effectiveness of different types of chemical agents Finding: 1. Practice of cutback while using all the 3 agents was found effective for the prolonged shelf life. 2. Need further experiments to define the effectiveness of single use of respective agents	- Continuation of research trials with further revised research plan (to be proposed)	- Review of the results of the research trials

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Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (5/9)

Product / objective of packaging development		What have been done during the 8th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
	Preservation of freshness/ quality of the cut-flower in the transportation process with development of economically viable transport packaging	- No progress		- Plan and conduct of the modified trials to finalize the development works <u>Request from PTD</u> - Verification of effectiveness of shipment of cut-flower at bud stage against the damage in the transportation process (and also for improved transportation efficiency): Need analysis of reason why it is not practiced in the Philippines

Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (6/9)

Product / objective of packaging development	What have been done during the 8th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Sweet Potato			
Value adding through post-harvest treatments: curing and maturing	- TWG meeting in Tarlac for possible dissemination of production of value added sweet potato	- Estimation of the cost of curing and maturing per unit volume (1 kg) of sweet potato - Estimation of the added value through consumer/panel evaluation	- Consolidation of the guideline for recommendation and dissemination
Reduction/ prevention of bruises on the surface during the post-harvest and transportation/ distribution process	- Modification of trial plan to reduce/prevent bruises and blemishes through actual conduct of the proposed improvement method. (No implementation since the samples are not available at this season)	- Conduct of the trial according to the revised research plan (in December)	- Review and analysis of the trial results

Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (7/9)

Product / objective of packaging development	What have been done during the 8th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Request from PTD: Improvement of post-harvest and transportation process of sweet potato for export promotion of semi-processed sweet potato (or, to attract importers/ buyers)	- Survey on required conditions for semi-processed export sweet potato Requirement: Increase in yield rate of semi-processed potato after removing outer part of potato, with minimizing bruises and other damages which affect the yield rate. The yield rates vary from 20-25% to 40-45%, depending on the extent damages of the sweet potato.		- Consolidation of the guideline for recommendation and dissemination including analysis of the economic profitability of the proposed practice, based on the result of the above trial

Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (8/9)

Product / objective of packaging development	What have been done during the 8th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on packaging related technologies			
Basics in designing MAP (To understand the factors to be considered in designing MAP, with exercises to define the factors quantitatively)	(Hands-on trainings with lectures on calculation of the respiration rate has been concluded in the 7th Fieldwork, and the report was supposed to be prepared by PTD on the series of trials on the respiration rate of broccoli)		- No additional experiments/ lectures
Cushioning package design	- Measurement of cushioning capacity of various materials available locally (for standard development and utilization) Not completed due to: 1. Delay in preparing the cushioning materials 2. Trouble of measuring equipment	- Continue the measurement on: 1. Newspaper 2. EPS 3. EPE 4. EPP, and 5. EPU	1) Continue the measurement on: 1. Air-cushion 2. Craft paper, and 3. Bulk cushioning materials 2) Summary of the measurement results

Annex 8-2-6: Accomplishments and Next Activities at the End of the 8th Fieldwork (9/9)

Explanatory Note (*1):

(1) Target of the product and packaging to be developed:

A product under the category of "Smoked Fish," which can be distributed without freezing under the ambient temperature at least for 3 months (and further 3 months if possible).

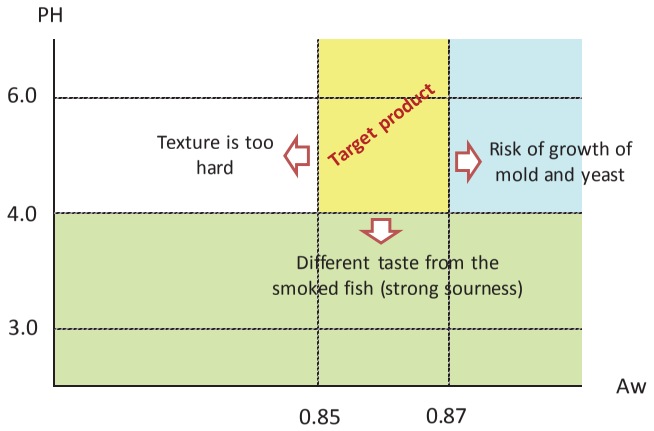
Basic requirements as marketable "*Smoked Fish*":

1) Attractive flavor from *smoking*

2) Mild texture which consumers expect to "smoked fish"

(Not steamed fish, not retort fish, not canned fish in terms of flavor, texture and taste.)

(2) Target product and the required conditions in view of food safety



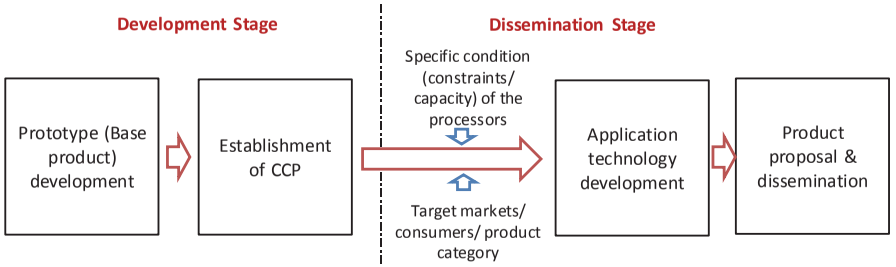
(3) Proposed method to process the target "Smoked Fish"

1) Cock at 80℃ (Low temperature cocking), while immersing in seasonings

2) Smoking at 70℃ for 1 hour

3) Use of barrier film to prevent oxidation

(4) Proposed process of product development and dissemination



Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (1/10)

Product / objective of packaging development		What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]	Development of flavor keeping packaging for husked & frozen durian flesh	1) Confirmation of long-term frozen storage test results of up to 2 months (since the 8th Fieldwork) 2) Verifying effectiveness of the package against smell leakage at frozen and ambient (thawed) temperature by a sensory test 3) Presentation of the trial results to TWG in Davao	- Follow-up of the responses of the potential users on application of the proposed packaging at their processing conditions, if any	- Finalization of the packaging development guideline (on-going)
	Support application of the developed packaging with proposal for value adding activities	- Review of the patent application documents (Not completed)	- Continuation of preparation of the patent application documents for application after confirming the above results	- Follow-up of the patent application

Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (2/10)

Product / objective of packaging development		What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Verification of economic viability of the proposed packaging		- Collection of data necessary for analysis and viability simulation - Provisional viability simulation		- Finalization and summary of the viability simulation for preparation of the packaging development guideline
Transport packaging of frozen durian and fresh whole durian	1) Defining the cold keeping capacity of hand-carrying box and transportation container for transportation of the frozen durian 2) Enhancement of handling hole of corrugated box for fresh whole durian transportation	- Presentation of the trial results to the TWG in Davao	- Follow-up of the responses of the potential users on application of the proposed packaging at their processing conditions, if any	- Summary of the trial results for guideline
Graphic design development on the packaging	Proposal on graphic design on the individual package and transport packaging for brand development	(Completed)		

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Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (3/10)

Product / objective of packaging development		What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Smoked fish				
Reduction of transportation costs and expansion of markets	Package & product development, which assumes distribution without cold storage	- Trial to establish CP (Critical Points) in processing the proposed product using small-scale pilot plant level facilities (at TESDA) (Not completed: need additional trials)	- Retrial using small-scale pilot plant level facilities (at TESDA) according to the assumed CP - 3 months-long shelf life verification test of the product	- TWG meeting in Bataan for possible application of the package & product to be developed, including the sensory test by outside panel to validate the marketability of the product in the local market - Improvement trials of marketability of the product according to the feedback from the potential users of the package & product

Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (4/10)

Product / objective of packaging development		What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Reduction of damage during transportation	Development of packages (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging to SMEs	- Provisional design of standard package for presentation in the TWG in Bataan (Designed but not presented due to cancellation of the TWG meeting)		- Presentation in the TWG meeting in Bataan for their feedback - Improvement of the design of the standard package according to the feedback from the potential users
Graphic design development on the packaging	Proposal on graphic design on the individual package and transport packaging for brand development	- Lecture on graphic design on packaging for brand development	- Development of the graphic design for brand development	
Verification of economic viability of the proposed packaging		- Collection of data necessary for analysis and viability simulation - Provisional viability simulation		- Finalization and summary of the viability simulation for preparation of the packaging development guideline

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Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (5/10)

Product / objective of packaging development		What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet – Tagaytay as an alternative site of cut-chrysanthemum for obtaining samples for laboratory tests)				
Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process	Preservation of freshness and quality in the distribution process (through use of freshness-preserving agents)	1) Review of the results of the research trials conducted by PTD after the last fieldwork, and confirmation of effectiveness of use of chemical agents for preservation of freshness and quality **[need confirmation]** 2) Confirmation of effectiveness of use of chemical agents for flowering buds some days after harvesting at the bud stage, and preserving its freshness and quality (using the cut-chrysanthemum obtained in Tagaytay) **[need confirmation]**	- Promote application of the research results to the chrysanthemum growers and distributors in Benguet, and retailers in Manila **[need confirmation]**	- Preparation of packaging development guideline including the additional findings from the feedback of the growers, distributors and retailers on the promotional activities to be conducted by PTD after the 9th Fieldwork **[need confirmation]**

Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (6/10)

Product / objective of packaging development		What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
	- Preservation of freshness/ quality of the cut-flower in the transportation process with development of economically viable transport packaging - Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- Design and trial use for 24 dozens of the cut-chrysanthemum at the bud-stage (fropm Tagaytay)	- Trial use of the designed box for 24 dozens and 48 dozens of the cut-chrysanthemum at the bud stage in Benguet with comparison with the current practice (bloomed chrysanthemum)	- Preparation of packaging development guideline including the additional findings from the trials to be conducted by PTD after the 9th Fieldwork
sVerification of economic viability of the proposed packaging		- Collection of data necessary for analysis and viability simulation - Provisional viability simulation		- Finalization and summary of the viability simulation for preparation of the packaging development guideline

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Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (7/10)

Product / objective of packaging development		What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Sweet Potato				
Value adding through improved post-harvest treatments	Verification of effectiveness of curing and maturing for bruise improvement and increased sweetness	(completed)		- Consolidation of the guideline for recommendation and dissemination
	Reduction/ prevention of bruises on the surface with improved post-harvest practice	- Conduct of field trial in Tarlac to verify the effectiveness of proposed post-harvest handling practice for reduction/ prevention of bruises	- Continuation of the trial on washing	- Review and finalization of the trial results

Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (8/10)

Product / objective of packaging development		What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
	Improvement of post-harvest and transportation process for export promotion of semi-processed sweet potato	(Completed) Note: Increase in yield rate of semi-processed potato after removing outer part of potato, with minimizing bruises and other damages which affect the yield rates, which vary from 20-25% to 40-45%, depending on the extent of damages of the sweet potato.		- Consolidation of the guideline for recommendation and dissemination including analysis of the economic profitability of the proposed practice, based on the result of the above trial
Verification of economic viability of the proposed packaging		- Collection of data necessary for analysis and viability simulation - Provisional viability simulation		- Finalization and summary of the viability simulation for preparation of the packaging development guideline

Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (9/10)

Product / objective of packaging development	What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on freshness-keeping packaging technologies			
Basics in designing MAP (To understand the factors to be considered in designing MAP, with exercises to define the factors quantitatively)	(Completed)		- No additional experiments/ lectures
Basics on transport packaging technologies			
Cushioning package design	- Measurement of cushioning capacity of various materials available locally (for standard development and utilization)	- Continue the measurement to obtain the consistent trial results	- Summary of the measurement results

Annex 8-2-7: Accomplishments and Next Activities at the End of the 9th Fieldwork (10/10)

Product / objective of packaging development	What have been done during the 9th Fieldwork period	Follow-up by PTD after the current fieldwork	Next fieldwork plan
Development of graphic design of the packaging for support promotion of the target products			
Package graphic design for regional brand development	- Lectures on package graphic design for regional brand development, including lectures on application for the cases of smoked fish and cut-flower		
Structural design of individual packaging boxes	- Lecture on use of development views and 3D views of carton boxes for structural design		

Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (1/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
(1) Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]				
1) Development of flavor keeping packaging for husked & frozen durian flesh	1) Confirmation of long-term frozen storage test results of up to 2 months (since the 8th Fieldwork) 2) Verifying effectiveness of the package against smell leakage at frozen and ambient (thawed) temperature by a sensory test 3) Presentation of the trial results to TWG in Davao		- Follow-up of the responses of the potential users on application of the proposed packaging at their processing conditions, if any	- Finalization of the packaging development guideline (on-going)
2) Support application of the developed packaging with proposal for value adding activities	- Review of the patent application documents (Not completed)		- Continuation of preparation of the patent application documents for application after confirming the above results	- Follow-up of the patent application

Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (2/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
3) Verification of economic viability of the proposed packaging	- Collection of data necessary for analysis and viability simulation - Provisional viability simulation	- Finalization of the viability simulation for preparation of the packaging development guideline		- Finalization and summary
(2) Transport packaging of frozen durian and fresh whole durian				
1) Defining the cold keeping capacity of hand-carrying box and transportation container for transportation of the frozen durian	- Presentation of the trial results to the TWG in Davao	- Follow-up of the responses of the potential users on application of the proposed packaging at their processing conditions, if any		- Summary of the trial results for guideline
2) Enhancement of handling hole of corrugated box for fresh whole durian transportation				

Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (3/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
(3) Graphic design development on the packaging				
- Proposal on graphic design on the individual package and transport packaging for brand development	(Completed)			
Smoked fish				
(1) Reduction of transportation costs and expansion of markets				
1) Package & product development, which assumes distribution without cold storage	- Trial to establish CP (Critical Points) in processing the proposed product using small-scale pilot plant level facilities (at TESDA) (Not completed: need additional trials)		- Retrial using small-scale pilot plant level facilities (at TESDA) according to the assumed CP - 3 months-long shelf life verification test of the product	- TWG meeting in Bataan for possible application of the package & product to be developed, including the sensory test by outside panel to validate the marketability of the product in the local market

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Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (4/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
				- Improvement trials of marketability of the product according to the feedback from the potential users of the package & product
2) Verification of economic viability of the proposed packaging	- Collection of data necessary for analysis and viability simulation - Provisional viability simulation			- Finalization and summary of the viability simulation for preparation of the packaging development guideline
(2) Reduction of damage during transportation				
1) Development of packages (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging to SMEs	- Provisional design of standard package for presentation in the TWG in Bataan (Designed but not presented due to cancellation of the TWG meeting)			- Presentation in the TWG meeting in Bataan for their feedback - Improvement of the design of the standard package according to the feedback from the potential users

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Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (5/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
2) Verification of economic viability of the proposed packaging	- Collection of data necessary for analysis and viability simulation - Provisional viability simulation			- Finalization and summary of the viability simulation for preparation of the packaging development guideline
(3) Graphic design development on the packaging				
- Proposal on graphic design on the individual package and transport packaging for brand development	- Lecture on graphic design on packaging for brand development		- Development of the graphic design for brand development	

Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (6/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet – Tagaytay as an alternative site of cut-chrysanthemum for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process (through use of freshness-preserving agents	1) Review of the results of the research trials conducted by PTD after the last fieldwork, and confirmation of effectiveness of use of chemical agents for preservation of freshness and quality **[need confirmation]** 2) Confirmation of effectiveness of use of chemical agents for flowering buds some days after harvesting at the bud stage, and preserving its freshness and quality (using the cut-chrysanthemum obtained in Tagaytay) **[need confirmation]**		- Promote application of the research results to the chrysanthemum growers and distributors in Benguet, and retailers in Manila **[need confirmation]**	- Preparation of packaging development guideline including the additional findings from the feedback of the growers, distributors and retailers on the promotional activities to be conducted by PTD after the 9th Fieldwork **[need confirmation]**

Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (7/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
(2) Preservation of freshness/ quality of the cut-flower in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- Design and trial use for 24 dozens of the cut-chrysanthemum at the bud-stage (from Tagaytay)		- Trial use of the designed box for 24 dozens and 48 dozens of the cut-chrysanthemum at the bud stage in Benguet with comparison with the current practice (bloomed chrysanthemum)	- Preparation of packaging development guideline including the additional findings from the trials to be conducted by PTD after the 9th Fieldwork
3) Verification of economic viability of the proposed packaging	- Collection of data necessary for analysis and viability simulation - Provisional viability simulation			- Finalization and summary of the viability simulation for preparation of the packaging development guideline

Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (8/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Sweet Potato				
(1) Value adding through improved post-harvest treatments				
1) Verification of effectiveness of curing and maturing for bruise improvement and increased sweetness		(completed)		- Consolidation of the guideline for recommendation and dissemination
2) Reduction/ prevention of bruises on the surface with improved post-harvest practice	- Conduct of field trial in Tarlac to verify the effectiveness of proposed post-harvest handling practice for reduction/ prevention of bruises		- Continuation of the trial on washing	- Review and finalization of the trial results

Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (9/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
3) Improvement of post-harvest and transportation process for export promotion of semi-processed sweet potato	(Completed) Note: Increase in yield rate of semi-processed potato after removing outer part of potato, with minimizing bruises and other damages which affect the yield rates, which vary from 20-25% to 40-45%, depending on the extent of damages of the sweet potato.			- Consolidation of the guideline for recommendation and dissemination including analysis of the economic profitability of the proposed practice, based on the result of the above trial
4) Verification of economic viability of the proposed packaging	- Collection of data necessary for analysis and viability simulation - Provisional viability simulation			- Finalization and summary of the viability simulation for preparation of the packaging development guideline

Annex 8-2-8: Accomplishments and Next Activities at the End of the 10th Fieldwork (10/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 10th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on freshness-keeping packaging technologies				
Basics in designing MAP (To understand the factors to be considered in designing MAP, with exercises to define the factors quantitatively)	(Completed)	No additional experiments/ lectures		
Basics on transport packaging technologies				
Cushioning package design	- Measurement of cushioning capacity of various materials available locally (for standard development and utilization)	- Continue the measurement to obtain the consistent trial results		- Summary of the measurement results
Development of graphic design of the packaging for support promotion of the target products				
1) Package graphic design for regional brand development	- Lectures on package graphic design for regional brand development, including lectures on application for the cases of smoked fish and cut-flower			
2) Structural design of individual packaging boxes	- Lecture on use of development views and 3D views of carton boxes for structural design			

Annex 8-2-9: Accomplishments and Next Activities at the End of the 11th Fieldwork (1/8)

Product / objective of packaging development	Activities and outcomes/ findings during the 11th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
(1) Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]				
- Flavor keeping packaging for husked & frozen durian flesh	- None (Planned support activities for the potential packaging users in application of the flavor keeping packaging was postponed to September, due to unavailability of durian because of abnormal weather condition.)		- Follow-up and support by PTD according to the instruction prepared by the JICA Team.	
(2) Transport packaging of frozen durian and fresh whole durian: **Completed**				
(3) Graphic design development on the packaging: **Completed**				

Annex 8-2-9: Accomplishments and Next Activities at the End of the 11th Fieldwork (2/8)

Product / objective of packaging development	Activities and outcomes/ findings during the 11th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Smoked fish				
(1) Reduction of transportation costs and expansion of markets				
- Package & product development, which assumes distribution without cold storage	- Continued shelf life verification test (on-going)		- Continuation of the shelf life verification test	- Confirmation of 3-months shelf life. - TWG meeting in Bataan for presentation of the package & product developed, and improvement trials of marketability of the product if necessary, depending on the feedback from the potential packaging users.
(2) Reduction of damage during transportation				
- Development of packages (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging to SMEs	- None			- Presentation in the TWG meeting in Bataan for their feedback - Improvement of the design of the standard package according to the feedback from the potential users

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Annex 8-2-9: Accomplishments and Next Activities at the End of the 11th Fieldwork (3/8)

Product / objective of packaging development	Activities and outcomes/ findings during the 11th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
(3) Graphic design development on the packaging: **Completed**				
Cut flower (Chrysanthemum from Benguet – Tagaytay as an alternative site of cut-chrysanthemum for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process (through use of freshness- preserving agents	- None		- Promote application of the research results to the growers and distributors in Benguet	
(2) Preservation of freshness/ quality of the cut-flower in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- None			- Modification of the specification and trial use of the designed box for 24 dozens and 48 dozens of the product at the bud stage for confirmation of the effectiveness of the proposed standard box with comparison with the current practice (bloomed stage)

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Annex 8-2-9: Accomplishments and Next Activities at the End of the 11th Fieldwork (4/8)

Product / objective of packaging development	Activities and outcomes/ findings during the 11th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Sweet Potato				
- Value adding through improved post-harvest treatments: **Completed**				
Broccoli & Cauliflower				
1) Development of packaging effective against transpiration for preservation of freshness of broccoli and cauliflower 2) Development of transport packaging for reduction of loss during long-distance transportation of broccoli and cauliflower	- Preparation for implementation of the trials to obtain baseline data for the packaging development			- Implementation of the trials to obtain baseline data for the packaging development

Annex 8-2-9: Accomplishments and Next Activities at the End of the 11th Fieldwork (5/8)

Product / objective of packaging development	Activities and outcomes/ findings during the 11th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Mangosteen				
- To be finalized (Possible objectives of the packaging development: 1) Preservation of freshness for longer period to avoid concentration of supply in season, and for extension of the markets 2) Development of frozen mangosteen for processing and/or extension of the markets 3) Development of an appropriate transport packaging to avoid deterioration of merchantability of mangosteen caused by dropping the product	1) TWG meeting in Davao for presentation of the Project objective, and discussion on the packaging development needs 2) Farm survey to obtain basic information on production and distribution of mangosteen 3) 1st stage experiments on mangosteen to obtain baseline data for the packaging development (incl. drop tests) 4) Preparation of supplementary experiments based on the initial findings from the 1st stage experiments		- Conduct of the follow-up experiment: deterioration after release from cold storage - Conduct of the "1st step - 1st stage" supplementary experiment: anti-fogging test - Conduct of the "1st step - 2nd stage" experiments: confirm test and frozen test	- Review of the results of the supplementary experiments to obtain baseline data for the packaging development - Setting packaging development objectives based on the results of the supplementary experiments (1st and 2nd stages)

Annex 8-2-9: Accomplishments and Next Activities at the End of the 11th Fieldwork (6/8)

Product / objective of packaging development	Activities and outcomes/ findings during the 11th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Tomato				
- To be finalized (Possible objectives of the packaging development: 1) Preservation of freshness for longer period to avoid concentration of supply in season, and for extension of the markets 2) Protection from physical shock during distribution, which can be the cause of over-maturing during distribution 3) Prevention of over-maturing in the distribution process of salad tomato to be harvested at matured stage to keep sweetness for value adding and branding	1) TWG meeting in Benguet for presentation of the Project objective, and discussion on the packaging development needs 2) Farm survey to obtain basic information on production and distribution of tomato 3) Preparation of 1st stage experiment plan to obtain baseline data for the packaging development			- 1st stage experiments to obtain baseline data for the packaging development - Setting packaging development objectives based on the results of the experiments

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Annex 8-2-9: Accomplishments and Next Activities at the End of the 11th Fieldwork (7/8)

Product / objective of packaging development	Activities and outcomes/ findings during the 11th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Rose from Benguet – Tagaytay as an alternative site of cut-rose for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process with use of chemical agents	- Review of the results of trials conducted by PTD - Preparation of supplementary trials plan based on the review		- Conduct of the supplementary trials	- Review of the results of the supplementary experiments - Conclusion of the research
(2) Preservation of freshness/ quality of the cut-flower in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- None			- Modification of the specification and trial use of the designed box for 24 dozens and 48 dozens of the product at the bud stage for confirmation of the effectiveness of the proposed standard box with comparison with the current practice (bloomed stage)

Annex 8-2-9: Accomplishments and Next Activities at the End of the 11th Fieldwork (8/8)

Product / objective of packaging development	Activities and outcomes/ findings during the 11th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on transport packaging technologies				
Cushioning package design	- Confirmation of modification in the measurement software of Shock Manager, and experiments on shock absorbing capacity of cushioning materials using the modified software	- Continue the measurement to obtain the consistent trial results	- Preparation of the cushioning materials	- Conduct of the cushioning performance tests - Summary of the measurement results
Development of graphic design of the packaging for support promotion of the target products: Currently no activity				

Annex 8-2-10: Accomplishments and Next Activities at the End of the 12th Fieldwork (1/6)

Product / objective of packaging development	Activities and outcomes/ findings during the 12th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
(1) Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]				
- Flavor keeping packaging for husked & frozen durian flesh	- None		- Support for the potential packaging users in application of the flavor keeping packaging according to the instruction prepared by the JICA Team.	
(2) Transport packaging of frozen durian and fresh whole durian: **Completed**				
(3) Graphic design development on the packaging: **Completed**				

Annex 8-2-10: Accomplishments and Next Activities at the End of the 12th Fieldwork (2/6)

Product / objective of packaging development	Activities and outcomes/ findings during the 12th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Smoked fish				
(1) Reduction of transportation costs and expansion of markets				
- Package & product development, which assumes distribution without cold storage	- Confirmation of 3 months' shelf-life	- Confirmation of 6 month shelf- life in February 2016	- Continuation of the shelf life verification test - Start consolidating results & data to prepare a final report	- TWG meeting in Bataan for possible application of the package & product to be developed
(2) Reduction of damage during transportation				
- Development of packages (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging to SMEs	- None		- Confirm the stock of the standard boxes used at IFEX	- Presentation in the TWG meeting in Bataan for their feedback - Improvement of the design of the standard package according to the feedback from the potential users
(3) Graphic design development on the packaging: **Completed**				

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Annex 8-2-10: Accomplishments and Next Activities at the End of the 12th Fieldwork (3/6)

Product / objective of packaging development	Activities and outcomes/ findings during the 12th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet – Tagaytay as an alternative site of cut-chrysanthemum for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process (through use of freshness- preserving agents	- None		- Promote application of the research results to the growers and distributors in Benguet	
(2) Preservation of freshness/ quality of the cut-flower in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- None			- Trial use of box for transport of 24 dozens of the product at the bud stage with comparison with the current practice (bloomed stage)

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Annex 8-2-10: Accomplishments and Next Activities at the End of the 12th Fieldwork (4/6)

Product / objective of packaging development	Activities and outcomes/ findings during the 12th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Rose from Benguet – Tagaytay as an alternative site of cut-rose for obtaining samples for laboratory tests)				
- Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process with use of chemical agents	- Review of the results of trials conducted by PTD, prepared the supplementary trials plan			- Conduct of the supplementary trials to verify significance of the effectiveness of the ingredients of the developed freshness preservation agents
Sweet Potato				
- Value adding through improved post-harvest treatments: **Completed**				
Broccoli & Cauliflower				
1) Development of packaging effective for preservation of freshness 2) Development of transport packaging for reduction of loss during long-distance transportation	- Provisional verification trials on preservation of freshness. - Design of the transport packages	- Update of the verification trial design on preservation of freshness with finding that MA could be applicable to broccoli	- Preparation of packaging for trial of transport packaging and for sample collection for freshness preservation trials	- Implementation of the Step 1 trials to obtain baseline data for the packaging development

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Annex 8-2-10: Accomplishments and Next Activities at the End of the 12th Fieldwork (5/6)

Product / objective of packaging development	Activities and outcomes/ findings during the 12th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Mangosteen				
To be set based on the results of the 1st step experiments results. 1) Preservation of freshness to avoid concentration of supply in season, and for extension of the markets 2) Development of frozen mangosteen for extension of the markets	- Review of the results of the experiments conducted by PTD to obtain baseline data for the packaging development	- Finalization of the review of the experiment results conducted by PTD - Preparation of supplementary experiments based on the initial findings from the 1st Stage of 1st Step experiments		- Supplementary and 2nd Step experiments (to be designed based on the review of the 1st Stage of the 1st Step experiments)
Tomato				
1) Preservation of freshness for longer period for extension of the markets 2) Protection from physical shock during distribution, which can be the cause of over-maturing during distribution	- Provisional verification trial practice on freshness preservation - Design of packages for transport packaging and sample transport		- Preparation of packaging for transport packaging trials, and for collection of samples for freshness preservation trials	- Implementation of the Step 1 trials to obtain baseline data for the packaging development

Annex 8-2-10: Accomplishments and Next Activities at the End of the 12th Fieldwork (6/6)

Product / objective of packaging development	Activities and outcomes/ findings during the 12th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Mango				
To be set based on the hearing surveys of exporters and contractors, and the 1st step experiments. Possible objectives include: 1) Control of maturation and over-maturation of fruits in the transportation process 2) Reduction of damage in the transportation process from farm to exporters	- Organization of TWG in Zambales, and conduct of the initial hearing survey on needs of packaging development	- Survey on needs of packaging development from the stand point of contractors and exporters - Preparation of Step 1 trial plan to obtain the baseline data		- Implementation of the Step 1 trials to obtain baseline data for the packaging development
Basics on transport packaging technologies				
Cushioning package design	- Experiments on shock absorbing capacity of cushioning materials using the modified software	- Continue the measurement to obtain the consistent trial results		- Summary of the measurement results
Development of graphic design of the packaging for support promotion of the target products: Currently no activity				

Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (1/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
(1) Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]				
- Flavor keeping packaging for husked & frozen durian flesh	- None		- Support for the potential packaging users in application of the flavor keeping packaging according to the instruction prepared by the JICA Team.	
(2) Transport packaging of frozen durian and fresh whole durian: **Completed**				
(3) Graphic design development on the packaging: **Completed**				

Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (2/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Smoked fish				
(1) Reduction of transportation costs and expansion of markets				
- Package & product development, which assumes distribution without cold storage	- Confirmation of 6-month shelf life - Documentation of product specification (in English)	- Final report to TWG	- Schedule the TWG meeting in Bataan	- TWG meeting in Bataan for presentation of the package & product development results for promotion of the application
(2) Reduction of damage during transportation				
- Development of packages (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging to SMEs	- None	- Final report to TWG	- Schedule the TWG meeting in Bataan - Confirm the stock of the standard boxes used at IFEX	- Presentation in the TWG meeting in Bataan for their feedback - Improvement of design of the standard package according to feedback from the potential users
(3) Graphic design development on the packaging: **Completed**				

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Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (3/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet – Tagaytay as an alternative site of cut-chrysanthemum for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process (through use of freshness-preserving agents)	- None		- Promote application of the research results to the growers and distributors in Benguet	
(2) Preservation of freshness/ quality of the cut-flower in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- None	- Modification and trial use of box for transport of 24 dozens and 48 dozens of the product at the bud stage with comparison with the current practice (bloomed stage)		- Modification and trial use of box for transport of 24 dozens and 48 dozens of the product at the bud stage with comparison with the current practice (bloomed stage)

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Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (4/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Rose from Benguet – Tagaytay as an alternative site of cut-rose for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process with use of chemical agents	- Effectiveness of the chemical agents for prolonged vase-life of cut-rose was verified with the proposed formulation	- Final report to TWG		- Summary of the research results - (Supplementary trials to reconfirm the effectiveness of the proposed formulation compared with Crysal)
(2) Preservation of freshness/ quality of the cut-flower in the transportation process				

Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (5/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- None	- Modification and trial use of box for transport of 24 dozens and 48 dozens of the product at the bud stage with comparison with the current practice (bloomed stage)		- Modification and trial use of box for transport of 24 dozens and 48 dozens of the product at the bud stage with comparison with the current practice (bloomed stage)
Sweet Potato				
● Value adding through improved post-harvest treatments: **Completed**				
1) Curing and maturing 2) Improvement of handling practice in the distribution process	- None	- Final report to TWG	- Schedule the TWG meeting in Tarlac - Presentation at Sweet Potato Festa in Tarlac on March 17, 2016.	- TWG meeting in Tarlac for possible application of the proposed post-harvest treatments and practices

Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (6/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Broccoli & Cauliflower				
1) Development of packaging effective for preserving freshness with restraining the respiration operation by adjusting composition of environment gas 2) Development of packaging effective against transpiration in the process of distribution 3) Development of transport packaging for reduction of loss during the long-distance transportation	- Step 1 trials: • Obtained the baseline data on freshness deterioration over time • Verified the possibility of adjusting composition of O_2 and CO_2 using thin LLDPE for restraining the respiration • Verified effectiveness of film packaging against transpiration • Obtained the baseline data on damages caused during the transportation process - Development of objective indicators on freshness deterioration of broccoli on the basis of the sensory tests on the freshness	- Summary of the data and findings of the Step 1 trials - Summary of the objective indicators on freshness deterioration of broccoli - Design and preparation of the Step 2 (lab-based) packaging development trials: • To define the specifications of LLDPE film packaging for MA • To design transportation package to reduce damages during transportation	- Summary of the data and findings of the Step 1 trials - Summary of the objective indicators on freshness deterioration of broccoli	- Implementation of the Step 2 experiments - Implementation of the Step 3 experiments to verify the effectiveness of the packages to be developed, including actual transportation test - Review and summary of the results of packaging development - Verify the applicability of the developed packages to cauliflower

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Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (7/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Mangosteen				
1) Preservation of freshness to avoid concentration of supply in season, and for extension of the markets 2) Development of frozen mangosteen for extension of the markets (Needs for transport package development is subject to confirmation by the growers.)	- None	- Review and summary of the results of the 1st Stage experiments of Step 1 conducted in 10th Fieldwork period - Plan of next step experiments based on the initial findings from the above experiments		- Supplementary and Step 2 experiments, for defining the specifications of packaging for freshness preservation, and development of frozen mangosteen (Detail to be prepared on the basis of the review and summary of the 1st Stage experiments' results.) - Design of the Step 3 experiments to verify the effectiveness of the packaging to be developed (The work plan in the next fieldwork period is subject to availability of the product at the target site.)

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Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (8/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Tomato				
1) Prevention of freshness deterioration during the distribution process 2) Develop effective prevention method of mold growth 3) Restraining of after-ripening of tomato harvested at full-ripen stage for better sweetness 4) Reduction of damages caused in the transportation process	- Step 1 trials: • Obtained the baseline data on freshness deterioration, mold growth, and after-ripening over time • Further analysis and theoretical projection is necessary to make judgement on possibility of adjusting composition of O_2 and CO_2 using thin LDPE for restraining the respiration • Effect of transpiration on quality deterioration is not significant even without film packaging	- Verification of the Step 1 results by theoretical calculation - The baseline data on damages caused during the transportation process could not be obtained, due to the forced change of the production site from Benguet to Laguna because of limited availability of tomato in Benguet	- Estimation of gas concentration inside pouch and simulation of optimum MA design for fresh tomato	- Supplementary and Step 2 experiments, for defining the specifications of MA packaging for freshness preservation, mold growth prevention, and restraining of the after-ripening, based on the follow-up trials by PTD - Step 1 experiments to obtain the baseline data on damages caused during the transportation process, and lab-based trials to reduce the damages

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Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (9/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
				- Step 3 trials to verify the effectiveness of the packages developed
Mango				
1) Restraining of after-ripening during storage and transportation to the distance export markets with use of ethylene absorption agents 2) Reduction of damages caused in the process of transportation from the production site to FTI in Manila	- Start of the Step 1 trials to obtain baseline data on after-ripening during storage, with confirmation of the effectiveness of ethylene absorption agents against after-ripening		- Continuation of the observation in the Step 1 trials on effectiveness of ethylene control	- Summary of the findings from the Step 1 trials - Step 2 (lab-based) experiments to define the appropriate packaging for restraining of the after-ripening - Step 1 trials to obtain the baseline data on the damages in the process of transportation to Manila - Step 2 trials (lab-based) on reduction of the

Annex 8-2-11: Accomplishments and Next Activities at the End of the 13th Fieldwork (10/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 13th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
				damages during the transportation to Manila - Step 3 trials to verify the effectiveness of the packages developed for restraining of the after-ripening and against damages during transportation
Basics on transport packaging technologies				
Cushioning package design	- None	- Measurement of performances of all the target cushioning materials is not yet completed.	- Continuation of the measurement of performances of the remaining cushioning materials, to obtain the consistent trial results	- Summary of the measurement results
Development of graphic design of the packaging for support promotion of the target products: Currently no activity				

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (1/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
(1) Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]				
- Flavor keeping packaging for husked & frozen durian flesh	- None		- Support for the potential packaging users in application of the flavor keeping packaging according to the instruction prepared by the JICA Team.	
(2) Transport packaging of frozen durian and fresh whole durian: **Completed**				
(3) Graphic design development on the packaging: **Completed**				

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (2/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Smoked fish				
(1) Reduction of transportation costs and expansion of markets				
- Package & product development, which assumes distribution without cold storage	- TWG meeting in Bataan for presentation of the package & product development results for promotion of the application	- Facilitation of technology application according to their specific application conditions, if necessary	- Follow-up on smoked fish producers interested in applying the technology	
(2) Reduction of damage during transportation				
- Development of packages (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging to SMEs	- Presentation in the TWG meeting in Bataan for their feedback		- Follow-up on smoked fish producers interested in applying the packages	
(3) Graphic design development on the packaging: **Completed**				

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (3/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Cut flower (Chrysanthemum from Benguet – Tagaytay as an alternative site of cut-chrysanthemum for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process (through use of freshness-preserving agents)	- None		- Promote application of the research results to the growers and distributors in Benguet	
(2) Preservation of freshness/ quality of the cut-flower (chrysanthemum) in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- None	- Modification and trial use of box for transport of 24 dozens and 48 dozens of the product at the bud stage with comparison with the current practice (bloomed stage)		

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Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (4/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Cut flower (Rose from Benguet – Tagaytay as an alternative site of cut-rose for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process with use of chemical agents	- Supplementary trial to reconfirm the effectiveness of the proposed formulation in comparison with that of Chrysal (completed)	- Final report to TWG - Facilitation of technology application	- Scheduling of a TWG meeting to present the development results - Compile results from the series of trials and prepare a conclusive report	- TWG meeting in Benguet for presentation of the technology development results for promotion of their application
(2) Preservation of freshness/ quality of the cut-flower (rose) in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- Actual transport tests against damages in the transportation process at the bud stage, regarding cushioning effect of crumpled newspaper	- Collection of baseline data on the damages during transportation (with current practice)		- Presentation in the TWG meeting in Benguet for their feedback - Improvement of box design according to feedbacks from the potential users, if necessary

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Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (5/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Sweet Potato				
(1) Value adding through improved post-harvest treatments: **Completed**				
1) Curing and maturing 2) Improvement of handling practice in the distribution process	- TWG meeting in Tarlac for presentation of the proposed post-harvest treatments and practices	- Further promotion of the research results, considering the limited participation of farmers in the TWG, while positive responses from the TWG meeting to the research results presented	- Organization of another meeting for the presentation, involving the farmers in the wider production areas of sweet potato in the region	

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (6/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Broccoli & Cauliflower				
1) Development of packaging effective for preserving freshness with restraining the respiration operation by adjusting composition of environment gas 2) Development of packaging effective against transpiration in the process of distribution	- Step 2 experiments to reproduce equilibrium gas condition with varied combinations of pouch size and content volume - 2 days longer shelf- lives were observed with the applied packages compared with that of no package - Equilibrium gas condition was obtained with LLDPE (20 μ m) under 30, 20 & 13℃ - The most significant indicator of end of shelf-life was color, and rotting appears after the end of the shelf-life	- Devising of measures to prevent dew condensation and microorganism development - Verification of the applicability of the developed packaging technologies to cauliflower - Final report to TWG		-Supplementary trials to reduce dew condensation - Verify the applicability of the developed packaging technologies to cauliflower - Step 3 experiments to verify the effectiveness of the proposed packages - Review and summary of the R&D results

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (7/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
3) Development of transport packaging for reduction of loss during the long-distance transportation	- Step 2 experiments to see effectiveness of crumpled newspaper as a cushioning material through actual transportation tests	- Summary of the best solution based on the results of Steps 1 & 2. - Prepare Step 3 experiments to verify effectiveness of the best solution transport packaging, which will be selected in the above, by actual transportation test - Verification of the applicability of the developed packaging technologies to cauliflower - Final report to TWG		- Prepare Step 3 experiments - Verify the applicability of the developed packaging technologies to cauliflower

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (8/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Mangosteen				
1) Preservation of freshness to avoid concentration of supply in season, and for extension of the markets 2) Development of frozen mangosteen for extension of the markets	None	- Review and summary of the results of the 1st Stage experiments of Step 1 conducted in 10th Fieldwork period - Plan of next step experiments based on the initial findings from the above experiments - Plan of experiments for development of frozen mangosteen	- Review and summary of the results of the 1st Stage experiments of Step 1 conducted in 10th Fieldwork period - Preparation for next step experiments	- Supplementary and Step 2 experiments for defining the specifications of freshness-preserving packaging - Experiments for development of frozen mangosteen - Step 3 experiments to verify the effectiveness of the packaging technology to be proposed based on the results of the above experiments

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Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (9/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
3) Development/ improvement of transportation packaging to prevent quality deterioration caused by shock during transportation and handling, if any	None	- Confirmation of needs for transport package development (according to the verification tests conducted during the 10th fieldwork period, no significant change was observed in quality by dropping of the product)	- Confirmation of needs for transport package development	

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (10/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Tomato				
1) Prevention of freshness deterioration during the distribution process 2) Develop effective prevention method of mold growth 3) Restraining of after-ripening of tomato harvested at full-ripen stage for better sweetness	(*) Step 2 experiments for defining specifications of MA packaging for freshness preservation, mold growth prevention, and restraining of the after-ripening (MA effects were confirmed in Step 1.) (*) Verification of the Step 1 and Step 2 results by theoretical calculations		- Summary of Step 2 experiments - Preparation for Step 3 experiments	- Step 3 trials to verify the effectiveness of the packages proposed based on the Step 2 experiments
4) Reduction of damages caused in the transportation process	- Lab-based trials on effectiveness of possible transport packaging methods (*) Planning for actual transport test	- The baseline data on damages caused during the transportation process could not be obtained, for the samples were procured from Tagaytay instead of Benguet	- Preparation for actual transport test	- Actual transport test from Benguet to obtain the baseline data and test the proposed transport packaging

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (11/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Mango				
1) Restraining of after-ripening during storage and transportation to the distance export markets with use of MA packaging or ethylene absorption agents	- Step 2 experiments to define the appropriate packaging for restraining of the after-ripening - Number of holes & volume of contents - Prevention of dew drop (MA effects were confirmed basically in Step 1) (*)Plan for Step 3 trials to verify the effectiveness of the proposed packaging technology under the actual transport environment	- Devising of measures to suppress latex spill	- Step 3 trials - Review and summary of the results of Steps 2 & 3 experiments	- Conclusion of the packaging development for Mango - Preparation for final report to TWG
2) Reduction of damages caused in the process of transportation from the production site to FTI in Manila	- Step 1 trials to obtain the baseline data on the damages in the process of transportation to Manila	(Transport packaging development will not be continued with confirmation of insignificant mechanical damages during transportation from the production sites to exporters' plant)		

Annex 8-2-12: Accomplishments and Next Activities at the End of the 14th Fieldwork (12/12)

Product / objective of packaging development	Activities and outcomes/ findings during the 14th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
Basics on transport packaging technologies				
Cushioning package design	- Completion of drop tests on all the planned cushioning materials	- Application of results to transport packaging of target products		
Development of graphic design of the packaging for support promotion of the target products:				
Regional branding and packaging graphic design	- Discussion on branding and packaging design development for heirloom rice and street foods - Advice and instruction on techniques for manipulation of design files and programs			

Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (1/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Durian				
(1) Expansion of markets (Expansion of demand for durian in the national market, and for foreign visitors as a souvenir item) [frozen durian]				
- Flavor keeping packaging for husked & frozen durian flesh	- Provision of film pouches to the potential packaging users for support conduct of the test marketing	- Provision of promotion materials highlighting "no leakage of odor" and proposing new scenes of enjoying "the King of Fruits"	- Preparation of promotion materials - Test marketing support	
(2) Transport packaging of frozen durian and fresh whole durian: **Completed**				
(3) Graphic design development on the packaging: **Completed**				

Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (2/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Smoked fish				
(1) Reduction of transportation costs and expansion of markets				
- Package & product development, which assumes distribution without cold storage	- Discussion on preparation of the training program of the potential users interested in the product and the package developed	- Preparation of a guidebook describing the product preparation process and the critical control points in the process in view of food safety for use in the training program - Fabrication of steamer and the smokehouse for training	- Preparation of a guidebook under the close communication with the JICA Team	- Start of the training program
(2) Reduction of damage during transportation				
- Development of packages (boxes) for standardized volumes (such as 5kg and 10kg, etc.) of smoked fishes, to encourage appropriate packaging to SMEs			- Follow-up on smoked fish producers interested in applying the packages	
(3) Graphic design development on the packaging: **Completed**				

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Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (3/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Chrysanthemum from Benguet – Tagaytay as an alternative site of cut-chrysanthemum for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process (through use of freshness-preserving agents)	- None		- Promote application of the research results to the growers and distributors in Benguet	
(2) Preservation of freshness/ quality of the cut-flower (chrysanthemum) in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- None	- Modification and trial use of box for transport of 24 dozens and 48 dozens of the product at the bud stage with comparison with the current practice (bloomed stage)		

Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (4/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Cut flower (Rose from Benguet – Tagaytay as an alternative site of cut-rose for obtaining samples for laboratory tests)				
(1) Preservation of freshness and quality, and avoiding the value reduction in the transportation and distribution process				
- Preservation of freshness and quality in the distribution process with use of chemical agents	- None	- Final report to TWG - Facilitation of technology application	- Scheduling of a TWG meeting to present the development results - Compile results from the series of trials and prepare a conclusive report	
(2) Preservation of freshness/ quality of the cut-flower (rose) in the transportation process				
1) Development of economically viable transport packaging 2) Verification of effectiveness of shipment of cut-flower at bud stage against the damage (and also for improved efficiency) in the transportation process	- None	- Collection of baseline data on the damages during transportation (with current practice) - Final report to TWG - Improvement of box design according to feedbacks from the potential users, if necessary - Facilitation of technology application		

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Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (5/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Sweet Potato				
(1) Value adding through improved post-harvest treatments: **Completed**				
1) Curing and maturing 2) Improvement of handling practice in the distribution process	- None	- Further promotion of the research results, considering the limited participation of farmers in the TWG, while positive responses from the TWG meeting to the research results presented		

Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (6/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Broccoli & Cauliflower				
1) Development of packaging effective for preserving freshness with restraining the respiration operation by adjusting composition of environment gas 2) Development of packaging effective against transpiration in the process of distribution	- Confirmation of the proposed experimental plan through provisional tests using samples available in Manila (Proposed experimental plan: 1) verification tests on effectiveness in producing equilibrium gas condition with better visibility, of the proposed OPP bags with different numbers of the holes; 2) Verification of the applicability of the developed packaging technologies to cauliflower)		- Scheduling and conduct of the proposed experiments with samples from Benguet	- Review and summary of the R&D results
3) Development of transport packaging for reduction of loss during the long-distance transportation	- Confirmation of the proposed experimental plan for Cauliflower			

Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (7/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Mangosteen				
1) Preservation of freshness to avoid concentration of supply in season, and for extension of the markets 2) Development of frozen mangosteen for extension of the markets	- Conduct of verification tests on effectiveness of the proposed OPP bag with pin holes for MAP (on-going) - Conduct of the test to define the end points of marketability of mangosteen (on-going) - Conduct of the tests on effectiveness of the aluminum-foil coated pouch in maintaining the quality of frozen mangosteen aril (on-going)		- Continued observation and measurement with close communication with JICA Project Team	- Review and summary of the R&D results
3) Development/ improvement of transportation packaging to prevent quality deterioration caused by shock during transportation and handling, if any	- Drop tests to study the impact of dropping on hardness of pericarp and quality of mangosteen		- Summary of findings in close communication with JICA Project team	

Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (8/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Tomato				
1) Prevention of freshness deterioration during the distribution process 2) Develop effective prevention method of mold growth 3) Restraining of after-ripening of tomato harvested at full-ripen stage for better sweetness	- None (Packaging development will not be continued)	- Summary of the research results		
4) Reduction of damages caused in the transportation process	- None (Packaging development will not be continued)			-

Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (9/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Mango				
1) Restraining of after-ripening during storage and transportation to the distance export markets with use of MA packaging or ethylene absorption agents	- Confirmation of the proposed experimental plan through provisional tests using samples available in Manila (Proposed experimental plan: 1) verification tests on effectiveness in MAP with better visibility, of the proposed OPP bags; 2) Verification of possibility of after-ripening after keeping mango for 3 weeks under the low temperature of 13℃)	- Devising of measures to suppress latex spill	- Scheduling and conduct of the proposed experiments with samples from Zambales	- Review and summary of the R&D results
2) Reduction of damages caused in the process of transportation from the production site to FTI in Manila	- None (Transport packaging development will not be continued with confirmation of insignificant mechanical damages during transportation from the production sites to exporters' plant)			

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Annex 8-2-13: Accomplishments and Next Activities at the End of the 15th Fieldwork (10/10)

Product / objective of packaging development	Activities and outcomes/ findings during the 15th Fieldwork period	Remaining issues/ tasks	Assignment/ plan for the remaining issues/ tasks	
			Follow-up by PTD after the current fieldwork	Next fieldwork plan
Basics on transport packaging technologies				
Cushioning package design	- None	- Application of results to transport packaging of target products		
Development of graphic design of the packaging for support promotion of the target products:				
Regional branding and packaging graphic design	- None			

Annex 9

Work Plan

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT OF SCIENCE AND TECHNOLOGY (DOST),
THE REPUBLIC OF THE PHILIPPINES

PROJECT FOR ENHANCING THE COMPETITIVENESS OF FRESH AND SEMI-PROCESSED AGRICULTURAL PRODUCTS THROUGH THE APPLICATION OF APPROPRIATE AND SUSTAINABLE PACKAGING TECHNOLOGY IN THE REPUBLIC OF THE PHILIPPINES

WORK PLAN

June 2013

UNICO INTERNATIONAL CORPORATION

TOKYO, JAPAN

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Preface

In response to the request by the Government of the Philippines, Japan International Cooperation Agency (JICA) agreed to implement the Project for Enhancing the Competitiveness of Fresh and Semi-Processed Agricultural Products through the Application of Appropriate and Sustainable Packaging Technology and signed on December 10, 2011 the Record of Discussions (R/D) that dictates the project's implementation.

This Work Plan is prepared to ensure mutual understanding by the Japanese and Philippine counterparts of the project's objective and content, together with their demarcation of responsibilities related to the project, while providing the basis of discussion on the project's implementation methodology and procedures.

1 Project Description

1.1 Background

Agriculture remains a main industry in the Philippines and farmers make up 35% of the entire working population in the country[1]. However, productivity in the agriculture sector remains low and agricultural production amounts to only 13% of GDP[2]. One of the most serious issues is post-harvest loss which substantially reduces the potential value of agricultural products. It is estimated that post-harvest losses for fruits ranges from 5% to 48% and 16% to 40% for vegetables[3]. Without these losses, expected earnings of farmers would have been higher. In the existing supply chain, the major reasons for post-harvest losses particularly during handling and distribution include lack of appropriate technology in transport and freshness keeping packaging and physical factors such as impact, vibration, compression, abrasion and mechanical damage. Hence, the Project is expected to contribute to the reduction of post-harvest losses.

The Packaging Technology Division (PTD) of the Department of Science and Technology (DOST) completed implementation of a JICA-assisted project entitled "Improvement of Packaging Technology for Philippine Food Products in the Regions" from June 2005 to June 2009. The project provided technical assistance to small and medium-sized enterprises (SMEs) in the food processing sector. The PTD has applied lessons learned under the project and transferred these learnings on packaging technology improvement to SMEs through its conduct of consultation services and seminars to the DOST Regional Offices.

Under the preceding project, capacity development on freshness keeping packaging and transport packaging design with corrugated boxes were conducted for food products. However, there is still need to further develop appropriate transport packaging technology that can be applied to semi-processed and fresh food products. Through simulation tests and assessment of needs of beneficiaries (e.g. farmers, distributors and retailers), such technology will reduce post-harvest losses and maintain freshness of produce.

Based on the above, the DOST and JICA agreed to implement the Project as it would further enhance the capacities of the PTD to sustainably implement packaging technology development and innovation for agricultural products.

[1] As of 2009. World Bank, World Development Indicators, 2012.
[2] As of 2011. World Bank, World Development Indicators, 2012.
[3] Philippine Development Plan 2011-2016, p.109

1.2 Framework of the Project

1.2.1 Objective of the Project

The Project is to be implemented with the primary purpose of building the technological capacity and mechanism to apply appropriate and sustainable packaging technologies for fresh and semi-processed agricultural products in the Philippines, and enhance the competitiveness of these products, through reduction of loss in the post-harvest and distribution processes, preserving freshness, and adding values.

The eight target commodities selected are:

1)	CAR	Benguet	Broccoli
2)			Cauliflower
3)			Cut-flower (Roses)
4)			Cut-flower (Chrysanthemum)
5)	Region 3	Tarlac	Sweet potato
6)		Bataan	Smoked fish
7)	Region 11	Davao City	Frozen durian
8)			Frozen mangosteen

1.2.2 Project sites

The Project will be implemented in Taguig City, Metro Manila, which is the location of the DOST-PTD, and also in Benguet in CAR, Tarlac and Bataan in Region 3, and Davao City in Region 11, which are the model sites of eight target commodities.

1.2.3 Key Stakeholders in the Philippines

(1) Implementing agency (Counterpart: C/P)

The Packaging Technology Division (PTD) of the Department of Science and Technology (DOST)

(2) Beneficiaries

Beneficiaries for the Project are assumed to be: (a) farmers/growers; (b) distributors (processing companies, wholesale distributors, logistics providers); and (c) retailors. They will be identified after the start of the Project in consultation with the counterpart by taking into account the current state of the supply chain for each of the target commodities in their respective

production areas and the existing distribution channels in the countries.

(3) Related Organizations

In addition to the DOST, to which the Philippine counterpart belongs, the Project is expected to require cooperation with the Department of Agriculture (DA), the Department of Trade and Industry (DTI), and local government units in target sites.

1.2.4 Scope of the Project

(1) Project Purpose

The post-harvest losses of eight (8) target commodities will be decreased through the introduction of appropriate transport packaging technology.

(2) Outputs

Output 1: An implementation process of technology development and introduction for eight (8) target commodities is finalized and the necessary planning and preparation are conducted.

Output 2: Appropriate transport packaging technologies for eight (8) target commodities are developed.

Output 3: The developed transport packaging technologies are introduced to eight (8) target commodities.

(3) Activities

For Output 1:

1-1: Formulate the Project Activity Plan and Capacity Development Schedule for the PTD staff to develop and introduce the transport packaging.

1-2: Discuss and identify the target sites from major production areas and the beneficiaries according to eight (8) target commodities.

1-3: Coordinate organization of the Technical Working Groups according to the target sites and/or developed technology, including the beneficiaries identified through Activity 1-2.

1-4: Formulate the Equipment Procurement Plan and purchase the necessary equipment based on the plan.

1-5: Formulate the PTD's Technology Transfer Plan for the DOST Regional Offices and the Satellite Toll Packaging Centers.

1-6: Revise the existing database, if necessary, as a tool to know the clients' needs and to

manage the consultancy service records.

For Output 2:

2-1: Develop a process flow for the development of transport packaging technology.

2-2: Conduct a survey on the situation of post-harvest losses of eight (8) target commodities and the collection of baseline data and specify how to measure the project indicator.

2-3: Create the Technical Working Groups based on the Activity 1-3 and confirm the needs of transport packaging through the regular meetings.

2-4: Revise the process flow for the development of transport packaging technology based on Activity 2-2 to 2-3.

2-5: Develop the transport packaging technology to keep the freshness and reduce damage during handling and distribution for eight (8) target commodities in collaboration with the Technical Working Groups and other relevant agencies.

2-6: Share with the Technical Working Groups and the concerned organizations the lessons learned from the project activities.

2-7: With regards to the beneficiaries who are engaged in the transport packaging development under Output 2, input the relevant information to the PTD's client database, which is referred in 1-6, identify the needs and manage the consulting service record.

For Output 3:

3-1: Collect the necessary information upon the actual packaging technology utilization by the potential technology users.

3-2: Conduct the continuous technical support to technology users involved in Output 2 for their actual technology adoption.

3-3: Develop the training module/manual for the dissemination of the transport packaging technology of eight (8) target commodities, including the lessons learned through Activity 3-2.

3-4: Prepare the schedule for information dissemination of transport packaging with the module/manual through Activity 3-3.

3-5: Technology transfer and dissemination activities are conducted based on the plan and schedule of Activity 1-5 and 3-4.

3-6: Conduct the continuous consultation to technology users, the DOST Regional Offices and the Satellite Toll Packaging Centers for the actual technology introduction.

3-7: Input the information of technology beneficiaries except ones through Output 2, to the PTD's client database, and utilize it to know their needs and manage consulting service record.

(Note: The above "Activities" are the same as that of II-4 of the Record of Discussions on the current Project agreed between JICA and DOST on December 10, 2012, except for the description underlined, which are revised to fit the actual conditions.)

2 Approach for Project Implementation

2.1 Approach from the Technical Perspectives

The major focus of the current Project is placed on not only technology transfer to the PTD, but also the improvement of competitiveness of the industries of the target agricultural products through introduction of packaging technologies to be developed under the Project. Considering these focuses of the Project, the JICA Project Team will set forth the following two points as the key stance of the approach to the Project in view of technical perspectives.

1. Technology transfer that takes into account the expected role and function of the PTD as a public research organization
2. Support promotion of the industries of the target agricultural products through packaging technology development

(1) Technology transfer that takes into account the expected role and function of the PTD as a public research organization

The Project will undertake the technology transfer to the PTD, in consideration of the expected role and function of the PTD as a government research institute in the Philippines in the field of packaging technology, namely:

1) Besides meeting the needs for building the capacity for consultancy services, the technology transfer of the Project to PTD will incorporate the PTD's basic capacity building, enabling the PTD to understand the technological base for applied packaging fields, covering, among other things, basic theory on packaging technology in each field, package design techniques, development of testing (study) plans, evaluation technology, and development of technical standards.

2) At the same time, information on new technologies, which may not be applicable to the PTD's clients currently due to their economic conditions, will also be provided to ensure the PTD's advanced position in the packaging technology.

3) In the technology transfer process, related activities including research and study, trial production and testing will be conducted under participation of the packaging industry, where it is considered applicable and useful.

4) An additional emphasis will be placed on the PTD's capacity building in relation to service

delivery in the regions. In particular, a packaging technology guideline[4] to be developed for each target commodity will be designed to be usable as a systematic education tool for DOST packaging coordinators who act at local level. It will also be used by the DOST Regional Office staff in charge of testing to learn about evaluation tests for individual packages.

(2) Support promotion of the industries of the target agricultural products through packaging technology development

Another focus of the Project is placed on the point that packaging technology developed by PTD as a result of the technology transfer by the Project to PTD, should be applicable to the practical use by the industry.

1) In line with the above emphasis, the technology transfer will be conducted giving due consideration of its applicability to the practical use and economic feasibility. In fact, some of the target commodities do not require development of a new packaging under certain conditions. Furthermore, there may be cases where introduction of packaging has negative impacts on product quality, e.g., if precooling is not practiced (see (1) of the Fourth Fieldwork in 4). The technology transfer, therefore, will partly include introduction of technology, which is not necessarily that of the packaging-related technology, particularly that in the area of post-harvesting and processing, if it is considered useful in solving problems identified in relation to a specific target commodity.
However, since there might be certain cases where the key problem solution does not fall into the PTD's scope of responsibility, the JICA Project Team and PTD will discuss and agree about the scope of packaging technology development at the start of the development works of the respective target products.

2) At the same time, the technology to be transferred to PTD should be the technology that can induce upgrading of the target industry as much as possible, i.e., its use leads to development of new markets or products, and/or increase the value of the products, wherever applicable.

3) On the other hand, it is important to understand that packaging technology is by no means a panacea for any problem. For instance, the improvement of distribution system, cultivation practice, harvesting and post-harvest treatment, etc. will play an important role in promotion

[4] See 2.3 (7)

of the agricultural production and businesses, but is out of the PTD's jurisdiction. Rather, the role of local government units (LGUs) is significant. In this connection, it is important to promote participation of LGUs in the Technical Working Group (as discussed later). On the other hand, in some cases the PTD's guidance on improvement of graphic design of packaging will be effective. In this context, the technology transfer on the graphic design of packaging is also planned to be conducted, when necessary.

2.2 Approach from the Project Management Perspectives

(1) Packaging development with sharing the progress and outcomes with stakeholders at the production sites and distributors of the target products

To encourage active participation of stakeholders at the production sites in improvement/development of packaging, a Technical Working Group[5] will be organized in each target site. The progress and outcomes of the packaging development will be shared with the Group continuously during the development process. As discussed in 4 "Overall Schedule" in detail, the following activities are assumed to ensure the active participation of the Technical Working Group in relation to the Project.

1) Workshops to organize the Group, to promote understanding of the Project and to ensure the Group's active participation in the development process (in particular, to promote understanding of feasibility of the developed packaging).

2) Cooperation of the Group in providing data to PTD and the Project Team, required for evaluation of cost-benefit of the developed packaging

3) Sharing of information with the Group, regarding the progress of the packaging development for their feedback

(2) Encouraging information exchange with the packaging industry in relation to the Project

With PTD's further cooperation with the packaging industry in packaging technology development in the Philippines in mind, the Project Team will try to provide the industry with information on the objective, contents and progress of the Project. Also, considering the future possibility of PTD to form a joint R&D team with the industry for a specific packaging development project of national concern, the Project Team will encourage information exchange with the industry under the current Project.

(3) Holistic approach to technology transfer from the JICA Project Team to the PTD by taking advantage of the counterpart training module and the PTD's own projects

[5] See 2.3 (6)

The PTD has their own on-going projects to improve packaging of agricultural products, while JICA plans to conduct a counterpart training module in relation to the Project. Taking advantage of all of these resources and opportunities available, the Project Team will take the holistic approach to ensure the effective technology transfer to the PTD.

3 Project Implementation

3.1 Project Implementation Framework

(1) The overall implementation process of the Project, and grouping of the target products

The Project will be conducted for the 8 target agricultural products. The Project phases are composed of the phases of "project planning and preparation," "transport packaging development" and "introduction and dissemination of developed packaging technology."

The phase of "project planning and preparation" will be carried out for all the target products at once, while the phases of "transport packaging development" and "introduction and dissemination of developed packaging technology" will be implemented group-by-group, with the target products being grouped into 4 product groups.

The first and second product groups are set as shown in Table 1, taking into account the factors such as seasonal availability of the products in the process of the packaging development, possibility to ensure the required testing and measuring equipment, and the progress of the PTD's relevant on-going projects, etc. The products of 3rd and 4th groups will be defined at the final stage of packaging development of the 1st and 2nd product groups, respectively. On the other hand, the products currently grouped in the 2nd group might be regrouped if the assumed conditions change before the start of "transport packaging development" for the group.

Table 1 Product groups

Product group	Product	Region	Target production area
1	Smoked fish	Region 3	Bataan
	Frozen durian	Region 11	Davao City
2	Sweet potato	Region 3	Tarlac
	Cut-flower (*)	CAR	Benguet

Note: (*) The kind of cut-flower will be decided later.

(2) Promotion of collaboration with Japanese companies

The Project is expected to promote collaboration among the local stakeholders and the concerned Japanese companies, where possible.

In this context, the JICA Project Team will provide the Japanese companies that show interest in the product with the relevant information obtained in the Project implementation process to encourage their interest in development of business relationship with the target products and sites.

(3) PR activity

In connection with the above activities, relevant information will be published on the DOST's website in cooperation with the PTD so as to let the Project and its progress known widely.

(4) Support updating of the PTD's client database regarding the guidance service under the current project

The JICA Project Team will support updating of the PTD's current database on their clients, regarding the guidance services provided under the current Project.

(5) Support for equipment procurement

In advance to the start of packaging development for the respective product groups, the Project team will define the materials and equipment necessary for the packaging development, and examine the PTD's existing stock of equipment and its operability as well as the PTD's plans to procure equipment under its own budget. Then, the JICA Project Team will recommend PTD and JICA about the materials and equipment to be procured for the packaging development under the current project.

(6) Technical Working Group

It is planned to organize "Packaging Development Technical Working Group (TWG)" at the production sites as an organization to cooperate with the PTD in conducting the packaging development. The TWG members are stakeholders relating to each commodity, who have the potential in terms of intention and opportunity relating to adoption of packaging technology to be developed by the Project. The TWG will be organized product-by-product even in the same geographical location.

The TWG, however, will not include the representatives of the support agencies at the national level. If such representation is considered necessary, upon consultation with the PTD, a committee (or an advisory board) to support development of packaging technology for agricultural products will be organized at the national level.

(7) Documents to be used for dissemination of the packaging technology to be developed

A comprehensive guideline for package design and dissemination, including detailed records on packaging technology development, relevant data, and key points in dissemination of the developed technology, will be compiled for each target product (see "Fifth fieldwork" (1) in 4 for information to be included in the guideline).

(8) Training plan in Japan

At this stage, the following two categories of training are assumed.

1) Training for packaging of agricultural products in each stage of distribution (including collective packaging, individual packaging, jigs and fixtures used for transport and storage), post-harvest treatment to prevent damage in the distribution process, and other relevant subjects
2) Training for transport packaging, packaging materials, and their evaluation tests

3.2 Project Implementation Structure

An overall organizational structure for implementation of the Project is shown below.

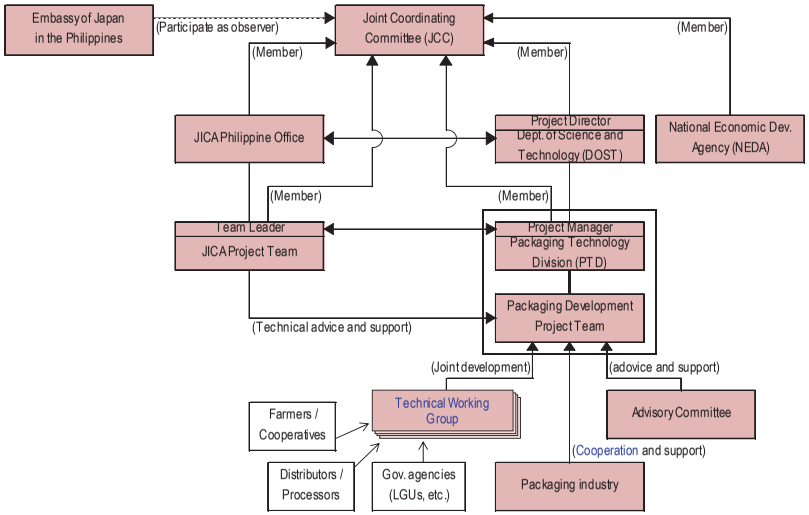

Figure 1 Project Implementation Structure

The composition and role of each organization that constitutes the overall structure is outlined below.

(1) Joint Coordinating Committee: JCC

The JCC will be formed according to the R/D; it will be chaired by the DOST's Undersecretary (Project Director) and will consist of representatives of related organizations in the Philippines and Japan. The JCC will be responsible for approval of the Project's overall work plan, monitoring of the Project progress, and consultation on major issues.

(2) Project Manager

The PTD's chief will act as the project manager and will be responsible for supervision and direction of overall management of the Project in collaboration with the JICA Project Team.

(3) PTD Project Team

The PTD Project Team will consist of the PTD staff and will be directly involved in activities

relating to the development of transport packaging technologies, including information gathering and analysis, design and prototyping, testing and commercial development.

(4) Packaging Development Technical Working Groups at the production sites (TWGs)

The TWGs will consist of potential beneficiaries of newly developed transport packaging technology for each target product (i.e., farmers/growers, distributors, and retailers), local government units (LGUs), and regional offices of central government organizations. The Group will work together with the PTD Project Team to develop and commercialize transport packaging technology that meets the actual needs relating to each commodity.

(5) Advisory Committee (or Support Committee)

The Committee will be organized to cover the target commodities on an as-required basis. It will consist of staff members of central government organizations, who will serve as liaison relating to the Project. It will provide advice, from perspectives of each organization, with regard to development and dissemination of appropriate transport packaging technology, while promoting cooperation among the related organizations and persons.

(6) JICA Project Team

The JICA Project Team will consist of experts dispatched by JICA and will provide support for overall implementation of the Project, while giving technical guidance and advice as required.

4 Overall Schedule

The Project will be conducted in the following three phases:

Table 2 Project Phases

Phase	Activity	Duration
First phase	Project planning and preparation	Project launch - mid-September 2013
Second phase	Transport packaging development	Mid-June 2013 - late November 2016
Third phase	Introduction and dissemination of developed packaging technology	Mid-November 2013 – the end of the Project

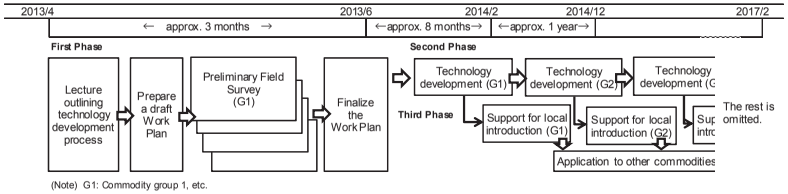

Figure 2 Project Implementation Process

Figure 2 shows a conceptual image of the project implementation process. Note that, up to finalization of activity plans (first phase), all activities including information gathering and assessment of opportunity to form a TWG will be carried out concurrently for all the target commodities (not necessarily in parallel but in logical sequence). After the finalization of activity plans, development of packaging technology and support for local adoption will be conducted in sequence set for each commodity group.

In the following section, key activities are outlined according to the planned implementation flow.

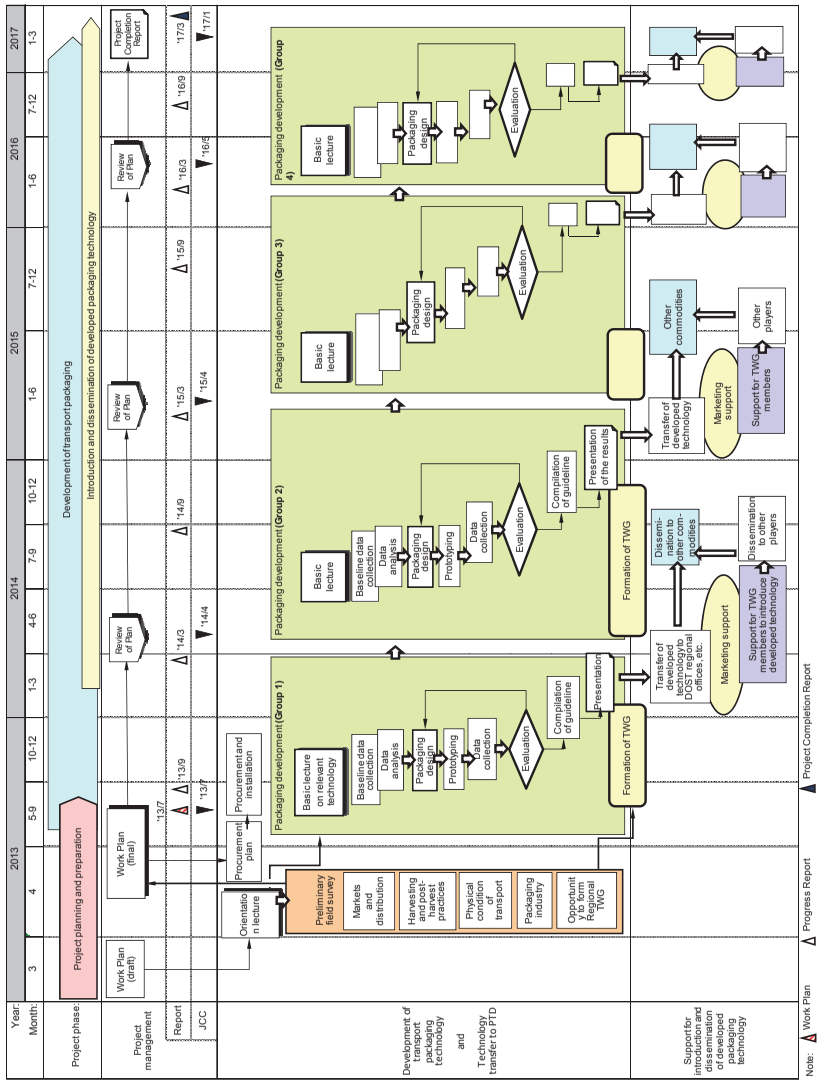

Figure 3 Project Flowchart

First phase: Project planning and preparation

[Preparation work in Japan] (Mid-March – late March, 2013)

(1) Development of the overall work plan of the Project (preliminary)

As the preparation for proposition of activity plans during the first fieldwork, a preliminary draft of the overall Work Plan will be prepared on the basis of project documents, which will include detailed activity plans.

(2) Preparation for a lecture outlining the packaging technology development process under the current Project

The lecture outlining the packaging technology development process under the current Project, which will be given upon the launching of the Project, will be prepared.

[First fieldwork] (Early April – End of April, 2013)

(1) Presentation of and discussion on an draft overall Work Plan

The draft Work Plan will be presented to the Industrial Development and Public Policy Department and the Philippine Office of JICA.

Then, the draft Work Plan, which reflects the feedback from JICA, will be presented to the Philippine counterpart for understanding and agreement on the Project's overall process.

The Work Plan will be finalized after reflecting the feedback from the Philippine counterpart and necessary modification based on the findings of the preparatory and planning stage.

(2) Lecture outlining the packaging technology development process

Upon the start of the Project, the JICA Project Team will give a lecture to promote understanding of the PTD Project Team on an overall picture of the technology development process to be undertaken under the current Project, for:

1. All the PTD Project Team members who will take part in the Project
2. Head office staff of government departments and related organizations, who will cooperate and support the Project

Table 3 Project Work Process Diagram

Items to be covered by the lecture

1) The objective and scope of the Project, and a planned implementation process
2) Transport packaging of agricultural products
   1. Characteristics of agricultural products, the respiration rate of vegetables, and preservation of freshness
   2. Risks of damages and losses of agricultural products in the handling, storage and transportation processes
   3. Damage to individual packages in the above process
3) Package design, prototyping, field testing, and evaluation
4) Key points of the preliminary field survey

(3) Preliminary field survey

The JICA Project Team will conduct the preliminary field survey, jointly with the PTD Project Team at the production sites of the target commodities. Major survey items are as follows:

Preliminary survey items[6]

1) Collection of preliminary data and information relating to post-harvest treatment, storage, handling, and transport of the target agricultural products

   For each target production area and distribution channel for each of the eight target commodities, the following data and information, which is required to develop detailed plans for packaging development and dissemination, will be collected.

   1. Farmers/growers, distributors and related parties, and marketers and related parties
   2. Consumer groups relating to a target commodity and their consumption patterns
   3. Suppliers of packaging materials for a target commodity
   4. Practices related to harvesting, local storage and transport to a final market, together with machinery and equipment, packaging materials, and cushioning materials used
   5. Price setting for each of the above processes (by buyer and product grade)
   6. Degree and extent of damage and loss for each of the above processes, and level of freshness and quality deterioration
   7. Seasonality relating to shipment of a target commodity and difference in the above items between different seasons

2) Preliminary survey on opportunity to form a Technical Working Group

   Farmers/growers, distributors and other organizations and persons relating to a target commodity will be contacted to find those who are willing to cooperate in package development

[6] Each of the survey items listed below is assumed to be undertaken under the PTD's leadership.

and introduce developed technology (to preserve freshness/quality and/or decrease loss and damage during transport) and to make preliminary invitation to participation in a Technical Working Group.

An emphasis will be placed to find farmers/growers and other interested parties who are highly expected to adopt packaging technology developed as a result of the Project, as measured by present customers and willingness for future market development, thus going beyond the mere interest in upgrading packaging technology. In addition to the private sector, efforts should be made to recruit organizations and persons relating to packaging technology, such as government organizations, local government units, and universities and colleges located in a target site, which are capable of extending cooperation.

(4) Collection of other relevant data and information

The following data and information, which are relevant to development of packaging technology, will be collected jointly with the PTD.

1. Data and information relating to local suppliers of packaging machinery and materials
2. Data and information relating to handling, storage and shipment in the Manila markets
3. Data and information relating to consumers' preferences on each commodity, in terms of freshness, quality and appearance
4. Data and information relating to food-related laws and regulations, testing and product standards, and existing testing laboratories

(5) Survey on the PTD as the recipient of technology transfer

Data and information on the PTD in the following areas will be collected to ensure appropriate support.

1. Professional background of the PTD staff and experience relating to packaging technology
2. Availability of machinery and equipment, and skill levels of the staff in relation to their operation and maintenance
3. Rate of progress in relation to the establishment of relevant testing standards
4. Track records in the areas of consultation, guidance and advice, and contract testing

(6) Survey on technological and financial resources that can be used for development and dissemination of transport packaging technology

Survey will be conducted jointly with the PTD for availability of technological and financial resources. Additional survey will be conducted for key personnel who are not listed here and are found in the course of the survey.

1. The DOST, its regional offices and satellite centers
2. The DA and the DTI
3. The Packaging Institute of the Philippines (PIP) and PhilExport
4. LGUs in the target sites (provincial and city/municipality)
5. The Land Bank of the Philippines (LBP)
6. Colleges and universities that provide technical support in any of the target areas

In the course of the above survey, the JICA Project Team will introduce the Project to these agencies and institutes, and find out the further possibility of dissemination of the technologies of packaging and post-harvest treatment to be developed under the current Project.

(7) Finalization of the Work Plan (plans for technology development, transfer, and dissemination)

On the basis of data and information collected as above, the overall Work Plan including technology development and dissemination plans will be finalized. In particular, the Plan will cover the following items (finalization is subject to the approval of the JICA Philippine Office).

1. Target commodities, objective of packaging development, and development goals
2. Packaging and evaluation technologies expected to be transferred to the PTD
3. Technology development and transfer process
4. Dissemination plan of the packaging and post-harvest treatment developed under the current Project (plans for sharing the information with the TWG on progress and achievement of packaging development, and the preliminary plans to introduce the packaging)

(8) Support for procurement of the equipment necessary in undertaking the Project

The JICA Project Team will propose the equipment and materials necessary to be procured in undertaking the Project, to the PTD and JICA in consideration of equipment and materials available in the PTD and planned to be procured by the PTD under its own budget.

(9) Outsourcing of a survey to collect base data required in analyzing the economic viability of the packaging development for eight target commodities

To assess the economic viability of the developed packaging in view of the target

beneficiaries, it is imperative to collect cost/price data and information for each commodity at each stage of its supply chain. The PTD and the JICA Project Team will try to collect such necessary data and information of the respective product groups in advance to the start of packaging development for the respective groups. If there is difficulty to collect the data and information sufficient for the analysis, despite the efforts by the PTD and the JICA Project Team, the survey will be outsourced to a local consultant.

(10) Finalization of the Work Plan at JCC

The final draft of the Work Plan will be presented to the JCC for approval.

(Note: Although the basic works of (1) through (10) above will be carried out in the first fieldwork period, supplementary works will be continued further in parallel with the packaging development works for the first-group products, and completed in the period of the third fieldwork. Nevertheless, the technology development plan and procurement plan of the equipment, for the second and subsequent groups of the target products, will not be finalized until the fieldwork period just before the start of the packaging development of the said product groups.)

Second Phase: Transport Packaging Development

In the first phase, preliminary surveys and preparation of the Work Plan were conducted covering all the target product groups. The succeeding process of the packaging development will be undertaken by product group (see Figure 4).

Table 1 Target Commodity Groups

Commodity group	Commodity
1	Smoked fish
	Frozen durian
2	Sweet potatoes
	Cut-flower

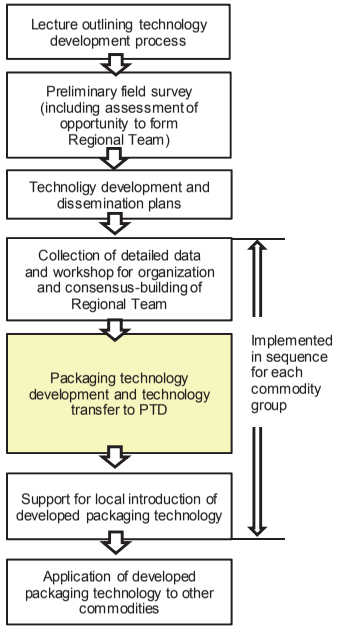

Figure 4 Work Flow

Note that packaging development which will be carried out for each product group will be completed within corresponding four fieldwork periods (namely, 2nd – 5th fieldwork periods for the first product group, 6th – 9th fieldwork periods for the second group, 10th – 13th fieldwork periods for the third group, and 14th – 17th fieldwork periods for the fourth group, respectively).

Before starting the packaging development and technical transfer activities, the JICA Project Team will prepare the "packaging development and technical transfer module" for each target product group to promote understanding of the PTD Project Team about the objective, process and research and development works to be carried out. Further, in advance to these modules, the JICA

Project Team will implement the Module 1, which is the module covering the basic knowledge required for implementation of the Project.

The modules for each product (Modules 2 -9) contain the following:

(1) Objective of Packaging Development (and Improvement of Post-harvest Treatment)
(2) Target Packaging Technologies (and Post-harvest Treatment)
(3) Packaging Development (and Improvement of Post-harvest Treatment)
  1) Fact finding
  2) Trial and development
  3) Research plan
    - Research title
    - Research plan (particular, date, equipment & materials needed, person in charge, venue, materials and equipment, and conditions)

Following sections describe the implementation process of the packaging development, technology transfer and the packaging dissemination, using the first product group as an example.

Outline of the packaging technology development, technology transfer and packaging dissemination process, for each product group, is shown in Figure 5.

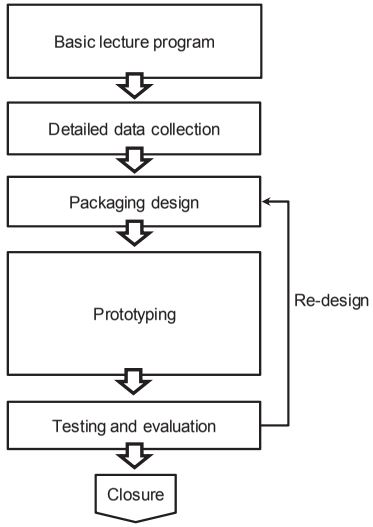

Figure 5 Implementation Process Assumed for Each Product Group

[Second fieldwork] (Mid-June – Mid-July 2013)

(1) The basic lecture program (Module 1)

The basic lecture program will be conducted to teach basic knowledge required for development of packaging technology for the agricultural products. The contents of the basic lectures will be finalized before starting the packaging development works for the target product groups.

(2) Organization of the Technical Working Group (workshop)

The Technical Working Group will be formed as an organization to lead dissemination of developed packaging. As the first step, a workshop will be held to ensure the active and self-motivated participation of the players in the production site, inviting potential participants who will learn the benefits of the packaging development as well as the beneficiaries of the development through analyzing market segments and competition of their products in the workshop.

The workshop will also serve as a good opportunity to understand the expectation of participants for the packaging development, including their requirements. Through the workshop, the JICA Project Team will collect data and information required for assessment of economic viability of the packaging changes. At the same time, the JICA Project Team will request the participants for their cooperation in collection of detailed data and information which are indicated in (3) below.

(3) Collection of detailed data and information at local level

The JICA Project Team will prepare the collection of data and information necessary for packaging design, which complements those acquired through the preliminary field survey, including the following.

1. Physical conditions of the product in the post-harvest, storage, transport and handling process, such as vibration, impact, compression, temperature, and humidity
2. Risk of inclusion of bacteria and viruses
3. Data required for assessment of economic viability of the package changes
4. Machinery, equipment and packaging materials readily available at the production site

Data collection methods will be explained to the PTD Project Team for follow-up of the data collection by the PTD Project Team.

[Third fieldwork] (Early-September – early October 2013)

(1) Packaging design

On the basis of the above data and information, an appropriate design for each commodity will be drafted. The design process will start with a lecture on package design techniques, followed by data analysis. Then, three design proposals will be developed and considered.

(2) Meeting with the TWG for sharing the packaging development plan

A meeting will be held to present packaging design proposals to the local Technical Working Group and obtain their comments and opinions from their perspectives, which will then be reflected in the design proposals, if it is considered appropriate and necessary.

(3) Prototyping

A prototype based on a developed packaging design will be made in the Philippines as far as practicable, and its trial manufacture will be contracted to a local packaging company when considered appropriate. Prototyping will be made for the following types of packages.

1) Collective packages
2) Transport jigs and fixtures
3) Individual packages

(4) Lecture on evaluation methods

A lecture session will be held to teach the PTD Project Team the methodology for evaluation, e.g., how it should be done according to what standards and how necessary data should be collected.

(The manufacturing of prototype packages and other relevant activities will be continued after the end of the fourth fieldwork, and the PTD will test the prototype packages in actual transport and collect relevant data.)

[Forth fieldwork] (Mid of November – early December 2013)

(1) Evaluation of prototype packages on the basis of field data

Data collected by the PTD with regard to conditions of prototype packages and other improvement techniques in the transportation process will be analyzed for evaluation of their effectiveness.

(2) Design modification/redesign, prototyping, and laboratory testing

Based on the above evaluation results, prototype packages will be redesigned. Then, new prototype packages will be manufactured and subjected to laboratory tests for evaluation.

(3) Information sharing with the TWG regarding the progress of the packaging development

The PTD and the JICA Project Team will share the information on the progress of the packaging development with the TWG, and reflect the feedback from the TWG members on redesign of the packaging, if applicable.

(4) Technical guidance for graphic design

Market value of some products can be increased significantly by using appropriate graphic design for their collective and/or individual packages. For such products, a workshop will be held to teach graphic design techniques to people having intention to introduce the developed package.

(5) Evaluation test in the actual transportation process

Prototype packages that have shown favorable results in the laboratory test in (2) will be applied for transportation in an actual distribution route to collect field data.

In principle, the actual transportation test will be conducted twice at most.

[Fifth fieldwork] (End of January – mid of February 2014)

(1) Overall review and summary of packaging technology development results and compilation of a development guideline

The packaging technology development process, which has been implemented through the above steps, will be reviewed, and lessons learned and key points in future development will be compiled and presented to the PTD as an integral part of technology transfer. This will be done at a review meeting that will be participated by staff members of the DOST Regional Office and satellite center in charge of each target site. The results will be compiled into a development guideline that covers the following items.

1. Description and specifications of developed packages
2. The packaging design process established and key points relating to each process step
3. Methodology for evaluation tests, standards, and key points relating to actual testing
4. Economics of the developed packages and key considerations in their dissemination
5. Supply of the developed packages
6. Possible application of the developed packages to other products

Third phase: Introduction and dissemination of developed packaging technology

[Fifth fieldwork] (End of January – mid of February 2014) (Continued)

(1) Sharing the results with the TWG (workshop)

A workshop will be held to share the development results, including developed packages, to the Technical Working Group. Economic advantages of developed packaging technology will be explained to participants by using a financial analysis model for a project (i.e., "introduction of developed packaging technology") that includes simulation results. Also, opportunity for market development that becomes available using developed packaging technology will be verified by reviewing the results of the workshop held at the start of the packaging development process.

In addition, consultation will be provided for individuals who are interested in introducing developed packaging technology, including technical guidance and future supply.

(Note that questions raised by participants at the workshops and consulting sessions, together with individual cases of introduction of developed packaging technology, will be incorporated into the development guideline. They will also be stored in the PTD's database to allow them to be used as reference materials for future service delivery.)

(2) Evaluation and guidance relating to graphic design (continued)

For persons who have received technical guidance for graphic design in the early stage, a workshop will be held as follow-up to evaluate graphic designs made by them.

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Continuous support for dissemination of developed packaging technology

Support for the PTD's activity to disseminate developed packaging technology will be provided on a continuous basis, including its application to other feasible products. The continuous support program can include the following activities:

1. To introduce developed packaging technology to staff members of the DOST Regional Offices and the Satellite Centers at the DOST's regular meetings.
2. To give advice on applicable issues raised by the DOST Regional Offices and Satellite

Centers (upon request by the PTD).

3. To give lecture at the PTD-planned seminars for the Packaging Institute of the Philippines and other organizations.
4. To publish relevant data and information on the PTD's website.

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The above activities in the second and third phases will be repeated for other product groups. The rotation schedule for the sequenced fieldworks for the first commodity group (2nd – 5th) and other groups is summarized as follows.

Table 6 Fieldworks Corresponding to the First Group's Process Steps

	Fieldwork			
First group	Second	Third	Fourth	Fifth
Second group	Sixth	Seventh	Eighth	Ninth
Third group	Tenth	Eleventh	Twelfth	Thirteenth
Fourth group	Fourteenth	Fifteenth	Sixteenth	Seventeenth