

Facultad de Ciencias Agrarias, Universidad Nacional de Asunción

Cooperativa La Norteña Ycuamandyú

Summary Report

Republic of Paraguay

Verification Survey with the Private Sector for Disseminating Japanese Technologies for Management of the Production of Processed Sesame Products

January 2018

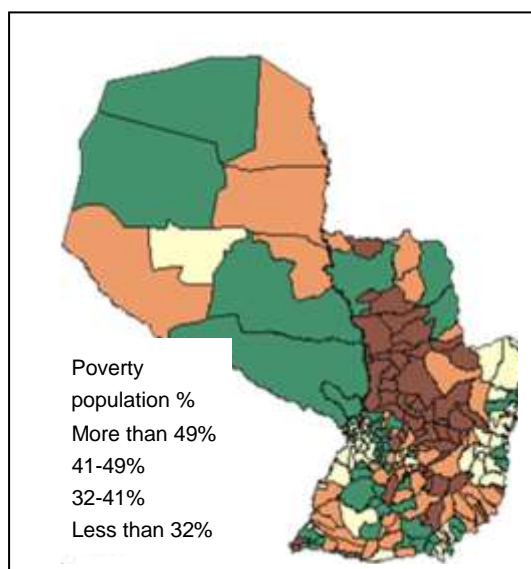
Japan International Cooperation Agency

Wadaman Science Co., Ltd.

1. BACKGROUND

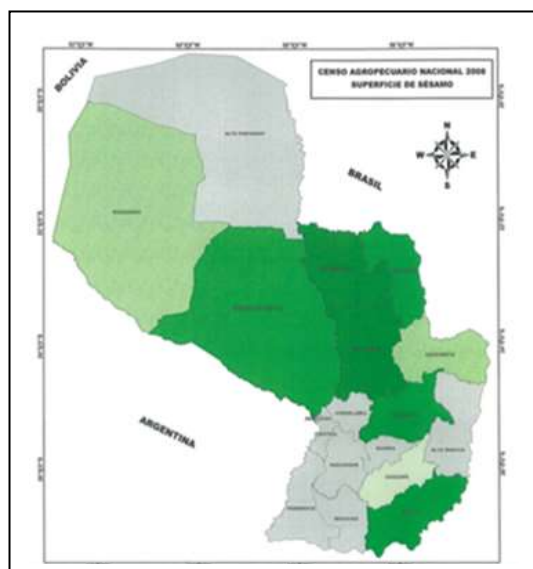
The agricultural sector has been the pillar of Paraguayan economy throughout its history. The export value of agricultural products such as soybeans, cotton, wheat, sesame seeds, meat, wood and sugar comprise 90% of Paraguay's exports by value and 27% of the country's GDP. The agricultural sector also plays an important role in the job market, considering that a quarter of the total population are farmers.

According to the National Agricultural Census of 2008, there are approximately 250,000 small-scale farmers possessing fewer than 20 ha. in Paraguay, representing the 83% of the country's farmers. The majority of these farmers live in the eastern and northern regions of the country, where the poverty level is high. Until the first half of the 1990s, the main product exported by these small-scale farmers was cotton. With the successive decline of the international price of cotton, sesame seeds have gradually replaced cotton, becoming the main income resources for the small-scale farmers during the period 2000 to 2008. As in the case of cotton, sesame seeds are also considered suitable crops for small-scale farmers, as they require intensive manual labor in the harvesting process.



Sources: Indicadores Básicos para focalizar el Gasto Social en Paraguay, DGEEC

Figure 1: Percentages of poverty population by area



Sources: Agricultural Census 2008 (CAN2008)

Figure 2: Main sesame production area

The Paraguayan sesame seeds are usually exported as raw materials, and approximately 70% of total volume produced in Paraguay is exported to Japan. The export volume has been fluctuating violently since 2007. Part of the cause of this fluctuation is attributed to the

increased detection of chemical residue in sesame seeds imported by Japan, after the adoption of a positive-list method in the Japanese law on chemical residues in 2006. The fact that the exported raw materials are constantly exposed to the volatility of international prices and that logistical and transportation costs in Paraguay tend to be higher for being a landlocked country, also negatively affect the international price competitiveness of Paraguayan sesame-seed exports.

One solution to the problem is to widen the export destinations to other countries. However, this solution would not change the farmers' situation significantly, as the high vulnerability to international price fluctuation would remain. Moreover, the promotion of exports to third countries could affect not only the good commercial relationships between Japan and Paraguay but also the continuous effort made by farmers of Japanese extraction in Paraguay who pioneered and developed the export of sesame seeds to Japan.

The other alternative is to explore the domestic market by encouraging the use of sesame seeds in the daily diet of Paraguayan people and promoting processed sesame products. Although Paraguay is the main sesame-seed exporting country in the world, the domestic consumption of sesame seeds in Paraguay is limited. Promotion of the nutritional value of sesame and development of processed sesame products that meet Paraguayan tastes will create a domestic consumer market and reduce exposure to international price fluctuation. At the same time, in a long-term perspective, as the farmers begin to consume the sesame seeds, they may change their minds about the use of agrochemical products.

This project aims to transfer and disseminate sesame-processing techniques to Paraguay, applying the techniques of Wadaman Science Co., Ltd., a Japanese company that develops and sells processed sesame products in the Japanese market. The local partners in the project are Facultad de Ciencias Agrarias of the National University of Asunción and Cooperativa La Norteña Ycuamandyú Ltda.

2. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

(1) Purposes

The purposes of the project are three:

- A. To transfer sesame processing technology to Paraguay,
- B. To verify the model of diversification and increase of added value of sesame products in Paraguay, and
- C. To disseminate processed sesame products in the domestic market and verify the feasibility of developing Wadaman Science's sesame business in Paraguay.

(2) Activities

The following specific activities have been implemented under three main components during the project:

Component A: Transference of sesame processing technology and demonstration of the model of diversification and increase of added value of sesame products in Paraguay

- Transfer of processing techniques

Activity A-1:

Workshops on sesame processing techniques for staff members of the Facultad de Ciencias Agrarias of the Universidad Nacional de Asunción (UNA) were conducted

Activity A-2:

Workshops on sesame processing techniques for public audiences were held in UNA.

- Diversification and increase of added value of the processed sesame products

Activity A-3:

UNA and Wadaman Science developed prototypes of the processed sesame products destined for domestic market.

Activity A-4:

Throughout the elaboration of the prototypes of the processed sesame products, Wadaman Science transferred the production and control techniques to UNA.

Activity A-5:

The newly developed prototypes of processed sesame products were improved by adopting the opinions of chefs and food related companies.

- Study mission in Japan

Activity A-6:

Two UNA staff members and one representative of Cooperativa La Norteña visited Japan to observe the value chain in the sesame market in Japan.

Component B: Verification of the feasibility of selling processed sesame products in Paraguay

Activity B-1:

Wadaman Science studied the legal system required for doing business in the processed-food sector in Paraguay.

Activity B-2:

To verify preferences in taste, quality, price and design of the prototypes of the products developed in activity A-4, questionnaires-based surveys were implemented with the collaboration of UNA and Cooperativa La Norteña.

Activity B-3:

An additional questionnaire-based survey was implemented for the improved prototype products by activity A-5.

Activity B-4

The economic efficiency of the prototypes was verified by analyzing the results of the questionnaire-based survey regarding the acceptance of the price for each prototype and respective production costs.

Activity B-5

Wadaman Science prepared its business plan, taking the process and the results of the project into consideration.

Component C: Improvement of knowledge of sesame products among Paraguayan people

Activity C-1:

A variety of materials were prepared to disseminate knowledge about sesame products, including presentation materials, recipes of sesame-based dishes, pamphlets and flip charts.

Activity C-2:

Several workshops were held both in Asunción and in San Pedro. The workshops consisted of two sessions: a theoretical session, with lectures and presentations regarding the history, nutritional values and different usages of sesame seeds; and a practical session, with activities for cooking and tasting various sesame-based dishes.

(3) Information of Product/ Technology to be Provided

The technologies provided by Wadaman Science to Paraguay through the local partners in the project consisted of sesame processing techniques and product development techniques.

◆ Sesame processing techniques:

For purposes of transferring the processing techniques, two sesame toasting machines designed by Wadaman Science were manufactured in Paraguay. The smaller of the two sesame toasting machines, measuring W0.74m x D0.66m x H1.05m, has a rolling metal grill with handles on both sides. The machine is used by manually rolling the metal grill with sesame seeds inside, while heating it on a portable gas stove placed below the metal grill. Additionally, two wooden mallets and two mortars were fabricated in Japan and transported to Paraguay.

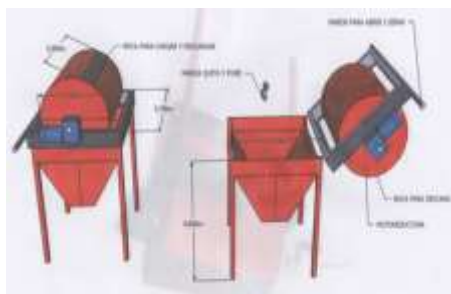


Figure 3: Sesame roasting machine



Figure 4: Wooden mallet and mortar

◆ Product development techniques:

Wadaman Science develops, produces and sells a variety of processed sesame foods pursuing the functionality (high nutritional benefits and effects) of the sesame seeds. The product development techniques provided by Wadaman Science through the project were focused mainly on developing local products by implementing a thorough questionnaire-based survey.



Figure 5: Products developed by Wadaman Science

(4) Counterpart Organization

◆ Facultad de Ciencias Agrarias, Universidad Nacional de Asunción

- Formal Name: Facultad de Ciencias Agrarias de la Universidad Nacional de Asunción
- Location: Av. Mariscal López 3492 c/26 de febrero, San Lorenzo, Central, Paraguay
- Year of Establishment: 1889
- Outline of the Institution: Universidad Nacional de Asunción is the oldest university in Paraguay, established in 1889. UNA comprises 12 faculties and graduate schools, with 800 instructors teaching 43,000 students. The Facultad de Ciencias Agrarias comprises six specialty departments: the Department of

Agriculture, Department of Forestry, Department of Ecology, Department of the Environment, Department of Agricultural Management and the Department of Agricultural Products Processing.

◆ Cooperativa La Norteña

- Formal Name: Cooperativa de producción agropecuaria e industrial La Norteña Ycuamandyyu Ltda.
- Location: Cerro Corá Esq. Independencia Nacional, Barrio San Miguel, San Pedro de Ycuamandyyú, San Pedro, Paraguay
- Year of Establishment: 1973
- Outline of the Institution: The cooperative has some 7,000 members, of whom 500 are farmers. Of these, 120 farmer members produce sesame seeds. The cooperative's main activities are financial and production services. The agricultural products handled by the cooperative include many products that are mainly produced by small-scaled farmers, such as sesame seeds (organic and non-organic), orange peels and organic herbs.

(5) Target Area and Beneficiaries

The project targeted its activities mainly on Asuncion, the capital of Paraguay, and on the Department of San Pedro, the country's main sesame producing region.

The beneficiaries of the project are sesame-seed farmers and sesame-related industries in the targeted area.

(6) Duration

From January 2016 to February 2018

(7) Progress Schedule

..... PLANNED
 — ACTUAL

ACTIVITIES	2016												2017												2018	
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DIC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DIC	JAN	FEB
0.Preparation																										
0-1.Joint Coordination Committee		—				
0-2.Procurement of equipment																									
0-3.Preparation of the laboratory																									
1.Dissemination of Processing Techniques and Product Development																										
1-1. Workshop on sesame processing techniques for UNA																									
1-2.Workshops on sesame processing techniques for public audiences at UNA				—				—															
1-3. Development of the prototypes of sesame products								
1-4. Elaboration of the prototypes													
1-5. Improvement of the prototypes																			
1-6. Study mission in Japan							—																		
2.Verification of the feasibility of selling processed sesame																										
2-1.Assessment of legal system for doing business in Paraguay																								
2-2. .Verification of the taste, quality, price and design of the prototypes													
2-3. Additional questionnaire-based survey																			
2-4. Verification of the economic efficiency of the prototypes																			
2-5. Verification of the business plan									—								
3.Improvement of knowledge of sesame products																										
3-1. Preparation of dissemination materials			—																					
3-2. Workshops in Asunción and San Pedro		—		—				—								

(8) Manning Schedule

IN PARAGUAY

NAME	TASK	ORGANIZATION		2016												2017												2018					
				JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DIC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DIC	JAN	FEB				
Katsunori Fukahori	Project Manager	Wadaman Science Co., Ltd.	PLANNED																														
			ACTUAL																														
Seima Fukumoto	Product Development/ Marketing	Wadaman Science Co., Ltd.	PLANNED																														
			ACTUAL																														
Taro Yoshida	Processing Techniques / Dissemination	Wadaman Science Co., Ltd.	PLANNED																														
			ACTUAL																														
Tamayo Ito	Chief Advisor	Kaihatsu Management Consulting Inc.	PLANNED																														
			ACTUAL																														

IN JAPAN

Katsunori Fukahori	Project Manager	Wadaman Science Co., Ltd.	PLANNED																													
			ACTUAL																													
Seima Fukumoto	Product Development/ Marketing	Wadaman Science Co., Ltd.	PLANNED																													
			ACTUAL																													
Taro Yoshida	Processing Techniques / Dissemination	Wadaman Science Co., Ltd.	PLANNED																													
			ACTUAL																													
Tamayo Ito	Chief Advisor	Kaihatsu Management Consulting Inc.	PLANNED																													
			ACTUAL																													
Kiyoko Sandabatake	Coordinator/ Dissemination	Kaihatsu Management Consulting Inc.	PLANNED																													
			ACTUAL																													

PLANNED: ACTUAL: Company Expenses:
 Number of working days: ()

(9) Implementation System

The Survey has been implemented with the following structure:

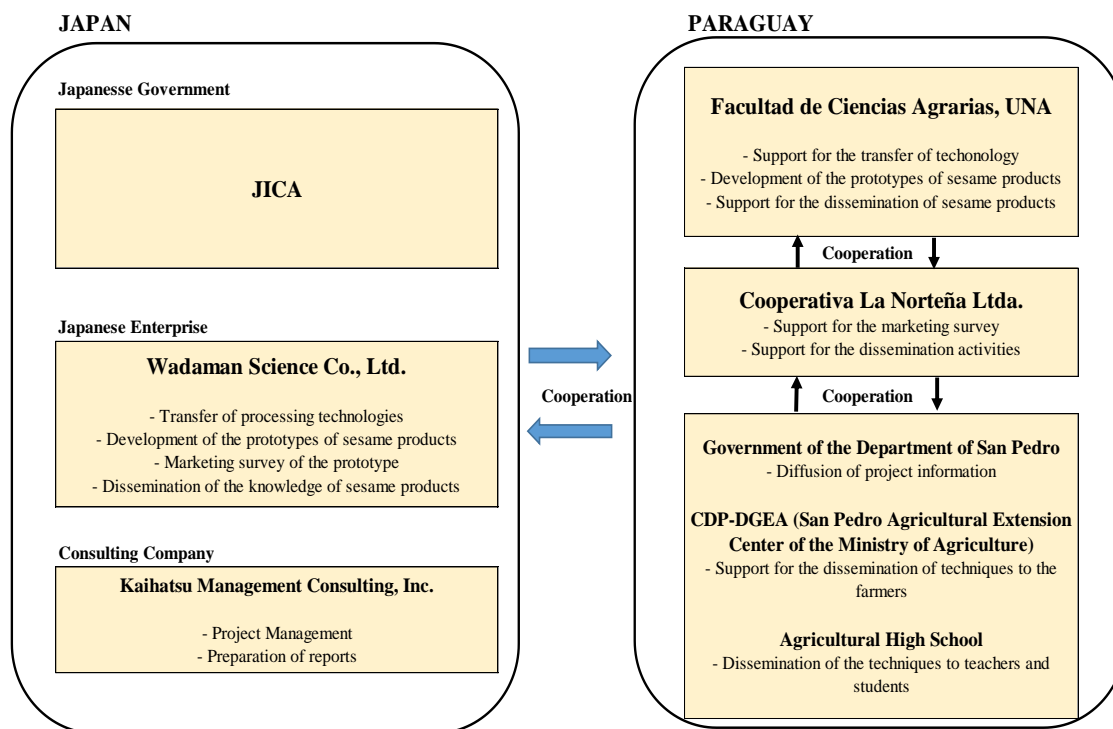


Figure 6: Implementation System

3. ACHIEVEMENT OF THE SURVEY

(1) Outputs and Outcomes of the Survey

The followings are the outputs and outcomes of the Survey executed during the project:

Component A:

Transference of sesame processing technology and demonstration of the model of diversification and increase of added value of sesame products in Paraguay

Outcomes of the workshops on processing technique:

- A Paraguayan sesame company that participated in the workshop developed a new original line of processed sesame products. The company incorporated its idea of giving flavor directly to sesame seeds after acquiring the basic and important technique transferred in the project workshop held in Asuncion.
- A restaurant owner who actively assisted to the project workshop held in San Pedro started to produce bread and bread stick with sesame in her restaurant. Afterwards, the restaurant established a bread selling corner in its facility.

- The agricultural extension officers in San Pedro who learned the sesame processing technique will continue disseminating the sesame toasting technique, the sesame recipes and the nutritional benefits to the sesame seed farmers they attend as part of their responsibilities.

Outcomes of diversification and increase of added value of the processed sesame products:

- After various questionnaire-based survey regarding the preference of Paraguayan taste, the Project team, organized by the staffs of Wadaman Science and UNA, developed seven prototypes of the processed sesame products. a) roast sesame, b) roasted and pounded sesame, c) Mani ku'i sesame¹, d) sesame sugar, e) sesame turrón, f) sesame honey and g) sesame fish.



Figure 4: Prototypes of processed sesame products developed by the project

¹ Mani ku'i sesame: sesame with mani ku'i. Mani ku'i is peanut granules, popular peanut product in Paraguay. "Ku'i" means "crushed" in Guarani language and "mani" means "peanuts" in Spanish.

Component B:

Verification of the feasibility of selling processed sesame products in Paraguay

Outcomes of the marketing survey of the seven prototypes of processed sesame products:

- The project team implemented a questionnaire-based survey collecting 217 data samples from Asuncion. The questionnaire consisted of asking the purchase intention and the reasons for the negative answers (regarding package, price, taste and volume).
- As a result of the questionnaire-based survey, the respondent expressed high purchase intention for the seven products. Almost 80% of the respondents expressed purchase intention. Although fish is rarely consumed in Paraguay because their main diet is meat, 60% of the respondent expressed the purchase intention of sesame fish, and other products such as sesame turrón reached to 89%.

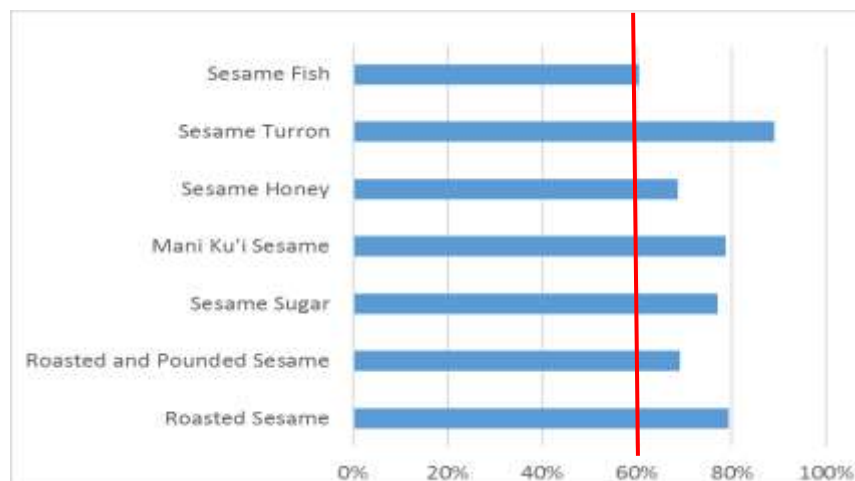


Figure 7: Purchase intention of the seven prototypes

- The price of each product was set assuming that the material cost would represent 40% of the unit price, so that the other cost and profit would account for 60% of the unit price. If the other cost would be 10%, the profit margin for each product would be 50%, depending on its production and sale methods.
- The profit margin by cultivation and sales of sesame seeds is approximately 39%. Consequently, the profit margin of the processed sesame products is higher than the profit margin of sesame seeds.

Table 1: Profit margin of sesame seeds and processed sesame products

		Sesame Seeds 780Kg of sesame seeds produced in 1 ha field.	Processed Sesame Products						
			Roasted sesame	Roasted and pounded sesame	Sesame sugar	Mani ku'i sesame	Sesame honey	Sesame turrón	Sesame fish
			250g	250g	500g	500g	250g	1 unit of turrón bar	190g
Sales	a	3,510,000	10,000	10,000	25,000	25,000	30,000	1,000	25,000
Production cost	b	2,150,000	3,750	3750	8,549	8,550	12,025	424	10,418
Profit	a-b	1,360,000	6,250	6,250	16,451	16,450	17,975	576	14,582
Cost margin	b/a	61%	38%	38%	34%	34%	40%	42%	42%
Profit margin	(a-b)/a	39%	63%	63%	66%	66%	60%	58%	58%

Notes:

The profit margin of the sesame seeds is based on hearings from the sesame seed farmers. The labor cost is included in the cost.

The cost of processed sesame products is based only on material cost, without taking in account labor and other cost.

Component C:

Improvement of knowledge of sesame products among Paraguayan people

- The project team implemented 10 workshops during the project and 130 persons who attended the workshops acquired the knowledge of sesame products by both theory-based and practical sessions.
- 3,000 recipe books with 21 sesame food recipes were created and distributed by the project team.
- 3,000 pamphlets promoting the nutritional benefit of sesame were distributed by the project team.
- In addition to the 10 workshops, the project team assisted various events held in Paraguay to promote sesame products. A sesame promotion booth was set up at the “Fiesta Patronal” in San Pedro, project activities were presented in “Expo MAG”, sesame promotion booth was settled in the “80th Anniversary of Japanese Immigration to Paraguay” held both in Paraguay and in Japan.

(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

- ◆ Facultad de Ciencias Agrarias, Universidad Nacional de Asunción
 - A practical training course on sesame processing techniques will be introduced in the practical courses offered by the faculty.
 - Outcomes of the project will be published on the website of the university.
 - The sesame toasting machine, wooden mallets and mortars donated to the

university will be managed by the faculty to loan it to the public inside the laboratory.

- Dissemination of sesame processing techniques, developed during the project period, will be continued by the faculty through Facebook.

◆ Cooperativa La Norteña

- Dissemination of sesame processing techniques to the farmers in San Pedro has been implemented by the extension officers of the Ministry of Agriculture in San Pedro with the leadership and coordination of the Cooperativa La Norteña. This dissemination structure will be maintained.
- The sesame toasting machine donated to the Cooperativa La Norteña will be managed by the Cooperative.
- The extension officers who give guidance on sesame production to the farmers will disseminate the sesame processing techniques to the farmers in coordination with the Cooperative.

4. FUTURE PROSPECTS

(1) Impact and Effect on the Concerned Development Issues through Business

Development of the Product / Technology in surveyed Country

◆ Development effect 1: Improvement of livelihood of the small-scale farmers

- Throughout the six workshops held in San Pedro, more than 100 persons, mainly sesame seeds farmers, along with local bakery and restaurants owners and their employees, have learned the sesame processing techniques. As a result, some bakery have started to sell processed sesame products and many sesame seed farmers who never ate sesame started to eat sesame by using the recipes learned in the workshops. These trends of local consumption in the sesame production area will lead to the improvement of the livelihood of the farmers in two ways: one way is by building a local consumption market for the sale of sesame seeds in their local market. The other way is by improving their own nutritional and dietary habits consuming the sesame seeds.
- More than 60% of the 217 respondents to the survey questionnaire showed the intention to purchase the seven prototypes of processed sesame products developed through the project. Sesame turrón (89%), roasted sesame (79%), mani ku'I sesame (79%), and sesame sugar (77%) were the most accepted products. The profit margin of these products will be 50% taking into account that material cost margin is 40% and assuming the remaining cost margin is 10%. If the sesame seed farmers would be able to sell these processed sesame products in addition to sesame seeds,

it is expected that they will be able to obtain alternative income sources whenever the international price of sesame seed declines or the demand for sesame seeds reduces.

- ◆ Development effect 2: Diversification of domestic sesame seed markets and exported sesame products
 - Throughout the workshops and dissemination activities held in Asuncion, where most of the participants were medium to high income level, the project team introduced many ideas and techniques for processed sesame products. It is expected that the domestic market for processed sesame will be developed causing a split-over effect to food processing companies, restaurants and retailers.
 - According to the Survey, the profit margin of the processed sesame products developed through the project is 10 to 20% higher than the profit margin of the sesame seed. The small-scale farmers will benefit by the diversification of local markets through the sale of simple processed sesame products introduced by this project.
 - Wadaman Science plans to import sesame oil manufactured by a Paraguayan sesame processing company to Japan. The imported sesame oil from Paraguay will be developed and introduced in Japan as a new original product, which consists on mixing it with the ordinary frying oil, making good use of the sesame oil's high antioxidant properties. If the plan materializes, it will offer possibilities for Paraguay to export manufactured products such as processed food to Japan, rather than primary goods.

- ◆ Development effect 3: Increase of the added value from sesame seeds to processed sesame products
 - The current export of Paraguayan sesame seeds is vulnerable to the international competition against other countries who produce sesame seeds and to the fluctuation of international prices. These vulnerabilities are the common characteristics to every raw material. Paraguay will be able to mitigate these vulnerabilities if export of higher added value products would increase.
 - Wadaman Science is planning to import Paraguayan sesame oil to Japan. If we compare the highest price and the lowest price of imported sesame seeds in Japan during the last 12 years, the difference was 141% (US\$2,274/ton and US\$944/ton). The difference was just 53% for the sesame oil import price in the same period (US\$3,557/ton and US\$2,325/ton). If Paraguay could export sesame oil to the

Japanese market, the price fluctuation would reduce from 141% to 53%, thus contributing to the stabilization of foreign currency acquisition.

Table 2: Prices of sesame seeds and sesame oil imported to Japan

Unit: US \$ / tons

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Difference between the highest price and the lowest price	Average price
Sesame Seeds	944	933	1,008	2,021	1,404	1,433	1,528	1,515	1,886	2,274	1,801	1,351	141%	1,508
Sesame Oil	2,432	2,325	2,381	2,959	3,557	3,278	3,272	3,191	3,237	3,400	3,374	3,059	53%	3,039

Sources: Trade Map, International Trade Centre

- Moreover, the creation and development of the domestic sesame consumption market will mitigate the risk of depending on the export of the raw material. For example, the expansion of domestic sesame consumption will cause a spill-over effect to other related sectors such as manufactures and retailers, mainly in the urban area. In the rural area, the farmers will obtain alternative income sources because they can produce and sell simple processed sesame products to the neighborhood local markets.

(2) Lessons Learned and Recommendation through the Survey

- Although this survey was implemented as an independent project, it was based on the groundwork of the long term effort and close partnership between the University of Asuncion and JICA through the “Project of strengthening and consolidation of production and use of improved sesame seeds for small-scale farmers in Paraguay”. It is expected that the Facultad de Ciencias Agrarias of UNA would integrate the perspectives of both different projects: how to produce good agricultural products and how to process them by exploring their properties.
- The survey was implemented through the close relationship between the Cooperativa La Norteña and the agricultural extension officers of the Ministry of Agriculture in San Pedro. It is expected that the Cooperative and the extension officers could advise not only the production techniques to the farmers, but also offer them different ideas to improve their livelihoods, such as producing and selling processed sesame or teaching the nutritional benefits of consuming sesame seeds.

