발 간 등 록 번 호
11-1543000-004411-01

Joint Research for 2022 KAPEX with the Republic of Paraguay

Strengthening Sesame Value Chain for Small-scale Farmers in Paraguay

2023. 6.

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이 보고서를 「2022 국제농업협력(ODA) 정책컨설팅(KAPEX)」 과제의 최종 보고서로 제출합니다.

2023년 3월

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1 Project Overview

1.1. Recipient country's request (PCP)

1.1.1 Summary of mutual consultation

❍ This is a project between the Ministry of Agriculture of Korea and the Ministry of Agriculture and Livestock (MAG) of the Republic of Paraguay.

❍ In Paraguay, the cultivation of sesame is an item of great economic importance, especially for small-scale farmers. 75% of the production is concentrated in the Departments of San Pedro and Concepción, in addition to other important areas. Cultivation plays a very important role, mainly for peasant family agriculture, since this is what somehow replaced cotton cultivation, the traditional item produced by this sector. Currently, there is a great demand worldwide, it could be said that it is even unsatisfied, therefore, for Paraguay, improving yields and expanding sesame cultivation areas represents a great opportunity, in addition to a significant increase in the income of small-scale farmers dedicated to the production of the item.

❍ A determining factor within the sesame production chain is the state of soil degradation as a result of years of agricultural production without the necessary inputs for good soil management and conservation, which is why in many cases crop yields are reduced. are affected by the poor nutritional status of the soil. Another no less important factor is the weakness and informality of producer organizations, which makes it somewhat difficult to access credit benefits or assistance through State programs and projects.

❍ These reasons have prompted the Ministry of Agriculture and Livestock of Paraguay to request official funds to help developing countries from the Ministry of Agriculture of Korea, in order to strengthen the value chain of sesame, especially produced by producers of peasant family farming. in Paraguay.

❍ The long-term objective of the project is to improve yields and increase the production area of the sesame crop in the Departments of San Pedro and Concepción, Republic of Paraguay.

❍ Regarding the estimated budget for this project, USD 5 million is requested in order to provide the necessary infrastructure, machinery, implements and inputs to 15 or 20 producer organizations.

❍ This is a project between the Ministry of Agriculture of Korea and the Ministry of Agriculture and Livestock (MAG) of the Republic of Paraguay. Through it, Paraguay hopes to increase sesame production, due to the increase in global consumption of this grain, setting as a long-term goal the strengthening of the sesame value chain in Paraguay, taking into account the importance of the sector mainly for family farming.

1.1.2. Project scope

❍ Establishment of production facilities, such as warehouses, cleaning places, grain classification, etc.

- Installation of warehouses equipped with scales, sieves, manual seeders, and humidity meters in at least 15 premises of sesame producer organizations. These facilities will be at different production points in the Departments of San Pedro and Concepción.

❍ Support for equipment and material

- The acquisition of tractors, subsoilers, grain cleaners, scales, sieves, manual seeders, humidity meters are planned.

❍ Capacity development: Training by invitation for officials, local training for technical officials, local training for farmers.

- Invitational Training to Korea for Policy and Technical Officials (Policies and Systems Related to Sesame Production, Operation of Processing Facilities, and Production Technology of KO7 Variety Sesame developed by KOICA)
- Local training for technical officials (operational training of sesame processing facilities and equipment, training in organizational strengthening, value chains, market insertion)
- Local training for farmers belonging to the organizations benefited from this project.

1.2. Project background and history

1.2.1. Background

❍ Paraguay has agricultural production potential, so it is very important to strengthen value chains. On the other hand, these chains are weakened or with a performance below the ideal. Therefore, it is necessary to focus efforts to improve the production and marketing conditions of this item.

❍ This project was promoted to improve sesame production conditions in the Departments of San Pedro and Concepción, in Paraguay.

1.2.2. History

❍ In 2021, Paraguay presents the PCP requesting the KAPEX project that strengthens the competitiveness of the agricultural and forestry sector.

❍ In 2022, KREI and MAFRA select the proposal presented to be implemented in 2022.

❍ In 2022, a technical mission is carried out from Korea in order to carry out a diagnosis on the state of competitiveness of the agricultural and forestry sector, as a result of this diagnosis it is proposed to make the project more specific and it is proposed to work on Strengthening the value chains of sesame for small-scale farmers in Paraguay.

❍ At the end of 2022 and the beginning of 2023, the joint coordination team between Korea and Paraguay was formed, made up of technicians from the General Directorate of Planning of the Ministry of Agriculture and Livestock and for Korea, professors from the Kangwon National University.

❍ In 2023, the Joint Research Agreement is signed between the Ministry of Agriculture and Livestock of Paraguay and the Kangwon National University for the elaboration of the Diagnosis of the value chain and the elaboration of the project profile.

❍ In 2023, the technical mission of professors from Kangwon University is received, as well as technicians from the Ministry of Agriculture and Livestock of Paraguay travel to Korea in order to internalize the details of the implementation of the project.

❍ In 2023, the PCP is presented for analysis and approval.

1.2.3. Feasibility study progress

❍ This feasibility study was carried out based on the contents of the project requested from the recipient country as shown in the following table.

〈Table 1〉 Progress of the feasibility study

Division	Receiving country request PCP (2021. 2)	Results of the feasibility study
Target area	San Pedro and Concepcion	No Change
The project budget	5 million dollars	No Change
project period	2024 – 2027 (4 years)	No Change
Project contents		
Identification and selection of producer organizations	Organizations selected from the application of compliance with evaluation indicators drawn up for this project.	No Change
Establishment and construction of infrastructures (deposits)	Construction of infrastructure for the deposit and cleaning of sesame seeds, equipped with scales, sieves, cleaners, etc.	No Change
Capacity Building	Local training for technicians and producers	Local training for technical officers; Local training for farmers belonging to the selected organizations
	Invited training for experts related to sesame production	Invitational training to Korea for policy and technical officials (Sesame related

Division	Receiving country request PCP (2021. 2)	Results of the feasibility study
		policies and systems, operation of sesame processing facilities, seed production)

1.3. Purpose of feasibility study and core contents

1.3.1. Purpose of feasibility study

❍ (Need) The role of project feasibility studies in agricultural ODA is emerging as important in the following aspects.

- Possibility of inconsistency between the recipient's country and project content.
- Limitation of establishing clear performance indicators and management indicators, etc.
- Various ministries and organizations implement ODA in the field of agriculture, forestry and fisheries, but efforts are required to increase efficiency/effectiveness.

❍ (Purposes) This project aims to improve yields in sesame cultivation and increase the income of agricultural households by improving the production infrastructure of the organizations.

- Field visits were made to prepare the Diagnosis of the sesame value chain through which the viability of the execution of this project is determined.
- Through the aforementioned diagnosis, it was possible to identify the most marked weaknesses that seek to be corrected through the different components established in the project.

- Through the meetings between the joint research teams, it was also possible to establish the feasibility of executing the project.

1.3.2. Scope of feasibility study

❍ This study is designed to carry out the Feasibility Study on the Project for the establishment of a sesame production infrastructure in Paraguay.

- The construction of storage and cleaning facilities for sesame seeds in San Pedro and Concepción.
- Support for machinery, implements and productive inputs.
- Strengthening the technical and organizational capacities of sesame technicians and producers in Paraguay.

❍ The scope of the project includes:

- Analysis of request of the receiving country.
- Review of the background and goal of the project.
- Verification of the content of the project.
- Creation of the PDM.
- Baseline Survey and final configuration.
- Project implementation plan.
- Detailed implementation plan according to project components.
- Qualitative and personnel survey (including unit price) and detailed calculation of the project budget.
- Analysis of the risk factors of the project and presentation of the crisis management plan.

- Suggestion to ensure sustainability after the complement of the project and others.
- Establishment of the monitoring and evaluation plan.
- Establishment of the environmental social management plan as established in the national regulations of the requesting country.

❍ The feasibility study of the project was carried out through the feasibility analysis by field and objective.

〈Table 2〉 Target of analysis by field

Field of feasibility	Target of analysis
Policy level feasibility	Policy coherence with the SDGs National strategy for socioeconomic development in the medium and long term Agricultural and rural development plans in the medium and long term, etc.
Technical feasibility	Establishment of infrastructure facilities and equipment analysis, state of possession Analysis of the location conditions of the destination site (climate, farmland, irrigation, transportation and logistics, electricity, Internet, etc.) Establishment of the basic plan for the baseline survey
Economical feasibility	Productivity increase Income increase Exportability
Social & cultural feasibility	Feasibility of carrying out a socio-cultural project Feasibility of incorporating the gender perspective
Environmental feasibility	Review of environmental laws, analysis of environmental and social impacts Establishment of the environmental and social management plan Environmental Issues to consider when building infrastructure

〈Table 3〉 Scope of analysis by target

Target	Data collection and scope of analysis
Farm households and seed companies	Sesame production status Process of sale and distribution of productive inputs Current status of the companies of collecting and processing companies. Current problems in the market at the national level
Stakeholders and related organizations	State of participation in the market of organized producers. Relationship between the roles of stakeholders in production and sesame distribution Project performance and lessons learned by other donors, organizations in the field related to the sesame value chain

Target	Data collection and scope of analysis
environment and institution	Current status of laws and systems related to the environment, such as climate change System related to the safety of products to be exported
Infrastructure	Current status of production facilities, irrigation facilities, agriculture, machinery, etc. Current status of sesame processing facilities, low-temperature warehouses, and related equipment Conditions of location (transport) and logistics (road, air)

1.4. Methodology of feasibility study

1.4.1. Survey overview

❍ Interviews have been carried out with producers and sesame purchasing and processing companies in the main production areas of the country, analyzing the current state of the sesame trade in Paraguay, confirming the business and infrastructure demand for the establishment of the production of sesame.

❍ Additional data related to the analysis of project objectives and project promotion was obtained from agricultural experts residing in the local area.

1.4.1. Survey content

❍ (Economic/Social/Agricultural Status) Analyzes economic, social, and agricultural conditions to establish the need for related policies and objectives, and appropriately set the direction of the project

❍ (Agricultural development strategies and similar projects in other donor countries) To seek an efficient implementation plan for the project by reviewing the

policy compliance of this project, and understanding whether other donor organizations such as international organizations are promoting similar projects.

〈Table 4〉 Contents of target area analysis

Contents	Scope of data selection and analysis
location conditions	Accessibility to big cities, agricultural areas Transport and logistics conditions Climate and natural environment (land, natural disaster)
Infrastructure for the production of sesames	Installation status of sesame production facilities and equipment sesame Processing Plant and Status of Related Equipment
Sesame production conditions	Current use of agricultural water (existence of irrigation, irrigation type etc) Power Usage Status

2 Project Feasibility Analysis[1)]

2.1. Current status of target areas and feasibility of selection

2.1.1. Current status of project country: Paraguay

❍ General Information

- Paraguay is a landlocked country, located in the center of South America and surrounded by Argentina, Brazil and Bolivia. Its territory extends between the parallels 19º18' and 27º36' South latitude and the meridians 54º19' and 62º39' West of Greenwich.
- To the north of this line is the torrid zone and to the south the temperate zone, its climate being subtropical with an average temperature of 17º in winter and

1) This chapter was written based on field research result of joint research team and internal data of Ministry of Agriculture and Livestock in Paraguay (MAG).

30º in January, except in the Chaco, where the temperature on hot days exceeds 40º. The main rainy season runs from December to March.

- The territorial surface of Paraguay is 406,752㎢ and its total population, at the end of 2016, according to an estimate by the National Statistics Institute, is 7,453,695 inhabitants. Its territory is watered by two large rivers, the Paraguay and the Paraná, each with numerous tributaries.
- The agricultural lands accounts for about 9%, and the grassland accounts for about 43%. Paraguay is divided into a total of 17 departments, divided into Eastern (14 departments) and Western (3 departments), which in turn are subdivided into Districts. The Eastern region accounts for 39% of Paraguay's total territory, and the Western region accounts for 61%. The Eastern region is active in agriculture, and the Western region is active in livestock.
- Paraguay is a primary industry nation that accounts for more than 60% of its annual exports in agricultural and livestock products, with 10.8% of its GDP coming from the agricultural and livestock sector. The main agricultural products of Paraguay are soybeans, corn, sesame, wheat, canola, sesame, and chia, and their production has been steadily increasing. In particular, soybeans have been the top export item for Paraguay for many years, and soybean meal has been the third-ranked item. Paraguay's climate and land are very suitable for soybean production, and as of 2020/21, Paraguay's soybean production ranks sixth in the world and its exports rank fourth in the world(MOFA. 2017).

2.1.2. Current status of target areas

❍ Target areas of seed processing facilities

- As it was possible to establish in the field visits and in meetings with repre-

sentatives of the companies dedicated to the collection and processing of sesame, in addition to representatives of KOPIA Paraguay, members of the Kangwon National University and technicians from the Ministry of Agriculture and Livestock, it was established The Departments of Concepción and San Pedro are the Project execution area.

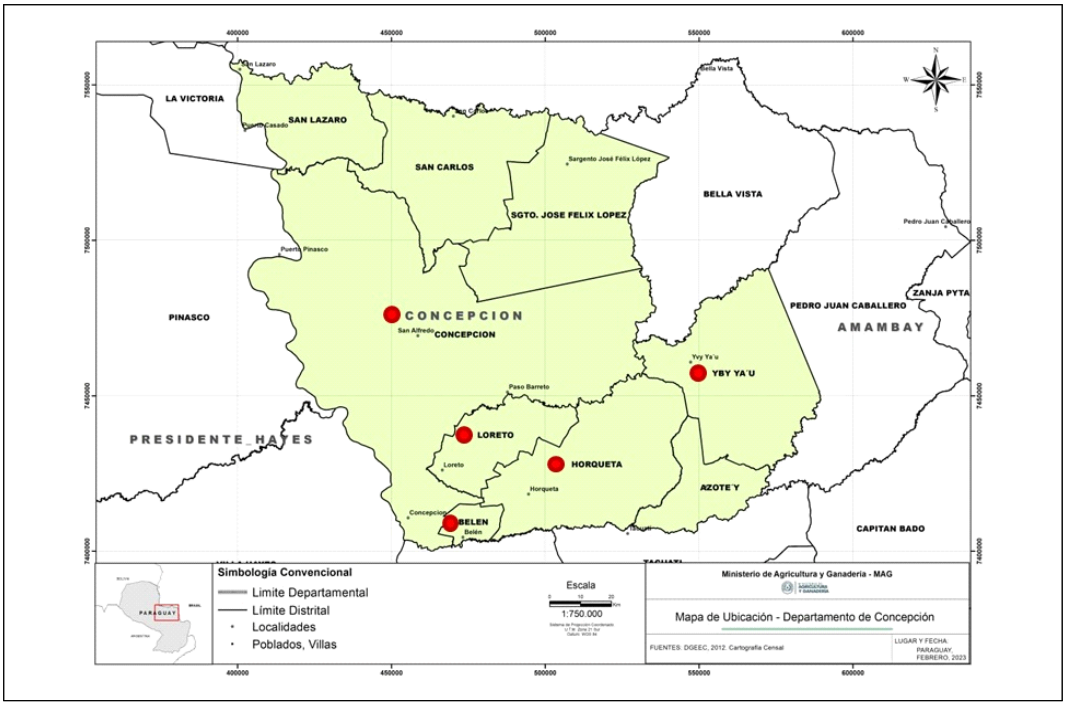
- The construction of infrastructure will be carried out on properties of the Organizations identified for this purpose, distributed in the aforementioned Departments and adjacent to the sesame processing plants of the anchor companies.

❍ Concepción

- The department is located to the north of the Eastern region, between the parallels 22º 00' and 23º 30' south latitude and the meridians 58º 00' and 56º 11' west longitude.
- The lands to the north and east, in the proximity of the Apa and Paraguay rivers, are high and with some isolated hills of relative elevation. The center and north are low and flat topography, with extensive pastures for grazing, which alternate with wooded areas. The southern part has higher terrain, gently sloping, with abundant timber forests for construction and joinery.
- Isolated and low elevation mountains stand out in the area, which are: San Luis and Vallemí to the north, Medina hill to the south, and Sarambí to the east. On the other hand, the department has an island, Peña Hermosa, which emerged from the Paraguay River.
- The main river is the Paraguay, navigable throughout its course by deep-draft vessels. Its tributaries, the Apa, Aquidabán and Ypané rivers, are navigable only by small boats. In the department there are several streams, streams and estuaries, which allow a good irrigation of the area.

- The average annual temperature was 25ºC, the average maximum reached 32ºC and the average minimum 20ºC. The total precipitation registered 1,298mm. The rainiest months were May and October, with rains of up to 245mm, and the driest August and September, in which precipitation reached only 25 and 27mm, respectively.
- Considering the economic sectors, 45% of the EAP is dedicated to primary sector activities (agriculture and livestock), 38% works in tertiary sector occupations (commerce and services), while the remaining 17% is absorbed by other activities and for people looking for their first job. The crops that have increased production in the department are soybeans, corn and sesame. Another important item is sugar cane, which despite having slightly decreased its production in the last decade, presents an interesting amount of harvested tons (DGEEC. 2016).

〈Figure 1〉 Project Target Area in Concepción



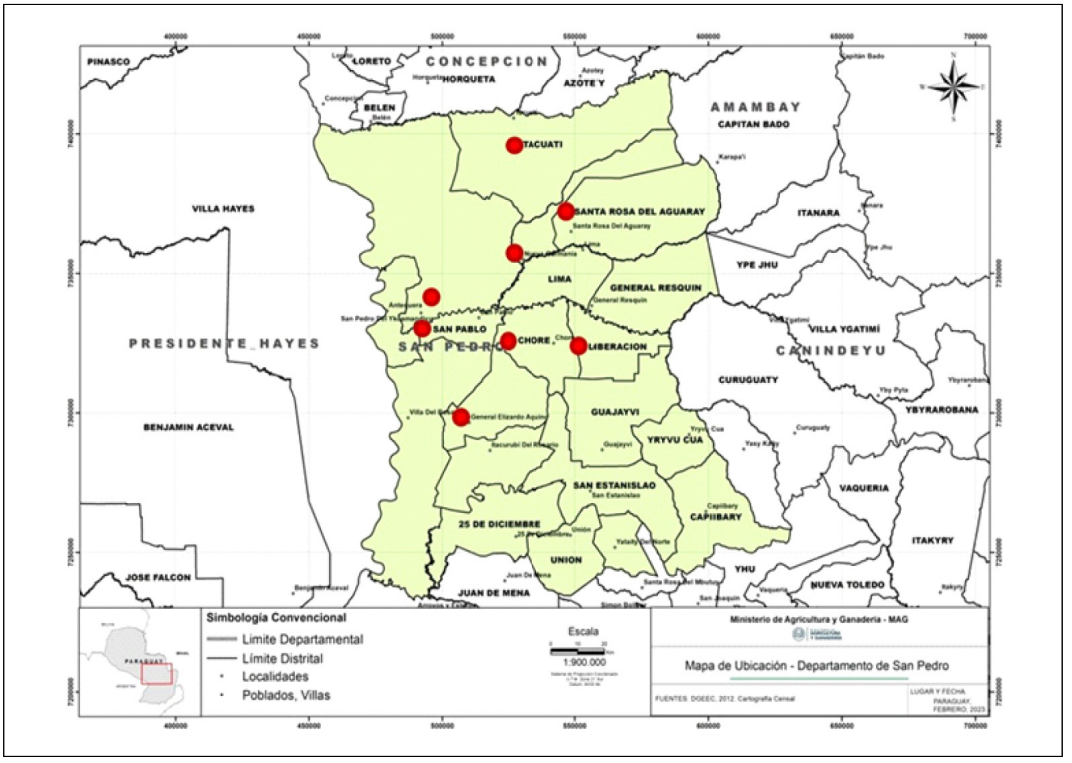
Source: MAG. Internal data

❍ San Pedro

- The department is located between the parallels 23º20' and 25º00' south latitude and the meridians 55º45' and 57º30' west longitude. It limits to the north with Concepción and Amambay, to the east with Amambay and Canindeyú, to the south with Caaguazú and Cordillera, and to the west with Presidente Hayes in the Western region, separated by the Paraguay River.
- San Pedro has two geographical areas with very different characteristics: the first, the coast of the Paraguay River, which in all its extension presents lowlands, forming plains in which there are scattered large estuaries, marshes and lagoons, and the second, to the east of the riverside zone, with high lands, very wooded and with abundant watercourses.
- In addition to the Paraguay River, the only one navigable by larger vessels, other rivers bathe the area: Ypané, Jejuí, Jejuí-guazú, Aguaray-mí, Aguaray-guazú, Curuguaty, Corrientes and Manduvirá, which are navigable by smaller vessels. Some 50 streams are scattered throughout the department, facilitating abundant natural irrigation and giving rise to the formation of extensive estuaries, such as Piripucú, Tacuatí, San Antonio, Yetyty, Tapiracuái, Peguahó, Mbutuy, Tobatiry and Aguaracatí.
- With a humid climate, in 2002 the average temperature was 23.6ºC, and the maximum and minimum reached averages of 30.7ºC and 18.9ºC. Rainfall reached 1,146mm, with February being the rainiest month and July the month with the least rainfall recorded.
- In coherence with a mostly rural population, the main economic sector is primary (agriculture and livestock). Among the main crops, soybeans and rice have had a significant increase in production, and corn and tobacco managed to recover their harvest volumes. At the national level, it is the department with the highest tobacco production, and the second with respect to sesame, de-

spite the fact that the number of tons harvested decreased significantly compared to the past decade. San Pedro is, on the one hand, the largest producer of equine cattle in the country, and on the other, bovine cattle in the Eastern region (DGEEC. 2016).

〈Figure 2〉 Project Target Area in San Pedro



Source: MAG. Internal data

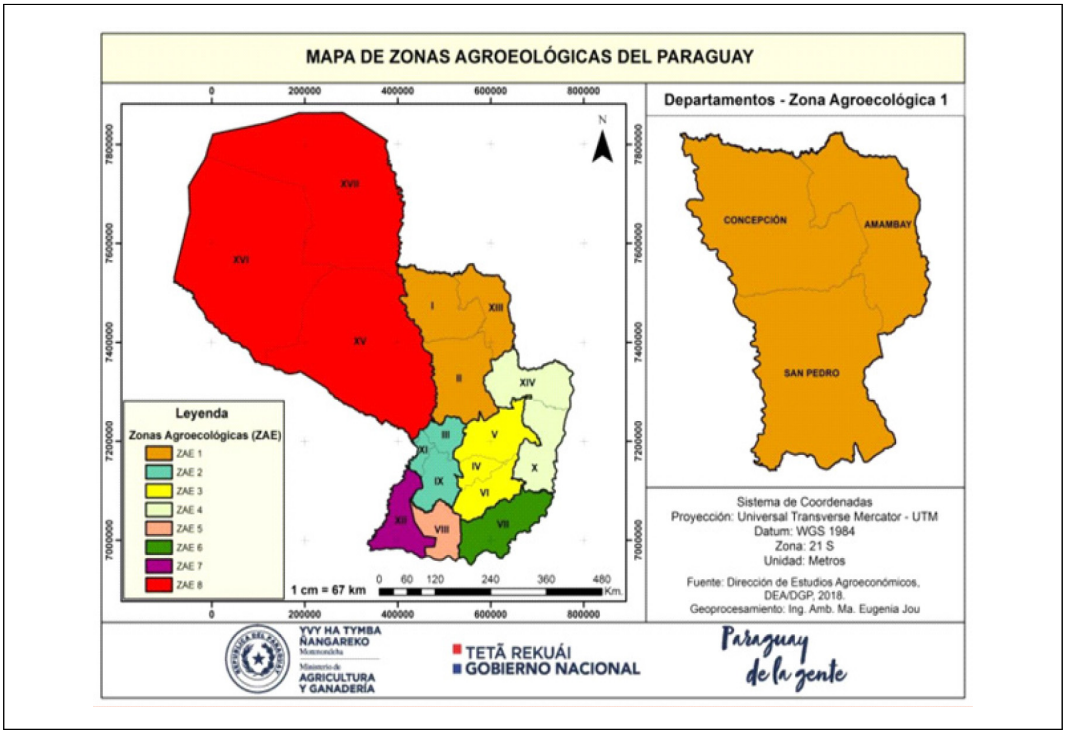
2.1.3. Agroecological Data

❍ Agroecological data of Concepción and San Pedro (North Agroecological Zone 1)

- North agroecological zone (ZAE 1) The North agroecological zone (ZAE 1) covers the departments of Concepción, San Pedro and Amambay, as can be seen in Figure 5.

- This area is a plain with a slope to the west, which directs its drainage towards the Paraguay River.
- Most of the area is covered by red-yellow and dark-red podzolized soils derived from sandstone, which are generally suitable for agricultural exploitation. Although to a lesser extent, they also have significance in the area of some soils derived from basaltic or metamorphic rocks and others that are alluvial.

〈Figure 3〉 Map of the Northern agroecological zone – ZAE 1



Source: MAG. Internal data

❍ Concepción,

- Regarding soil fertility in Concepción have the following average percentage values in soil: Clay 35.24; Organic matter 1.16%; Phosphorus 8.97mg. kg-1 ; Potassium 0.14 Cmol(+) Kg-1 ; Sulfur 6.97mg. kg-1 ; Calcium 1.57 Cmol(+)

Kg-1 ; Magnesium 0.69 Cmol(+) Kg-1; Cation exchange capacity 6.11 Cmol(+) Kg-1; pH (water) in soil 6.30; base saturation 62.87%; Aluminum 0.01 Cmol(+) Kg-1; Need for agricultural lime 0.73 (Ton/Ha)-1. - The soil fertility value of the 620 plots, considering the soil values studied in the mentioned localities, is averaged at 6.61 and is described as high fertility.

❍ San Pedro

- In San Pedro, cities have the following percentage values of soil: Clay 29, 85%; Organic matter 1.11%; Phosphorus 9.96mg. kg-1; Potassium 0.28 Cmol(+) Kg-1; Sulfur 8.14 mg. kg-1; Calcium 3.25 Cmol(+) Kg-1; Magnesium 1.17 Cmol(+) Kg-1; Cation exchange capacity 6.27 Cmol(+) Kg-1; pH (water) in the soil 6.42; Base saturation 60.26%; Aluminum 0.02 Cmol(+) Kg-1; Need for agricultural lime 0.92 (Ton/Ha)-1. The soil fertility value reaches 6.38, which corresponds to high fertility.

2.1.4. Sesame Production in Paraguay

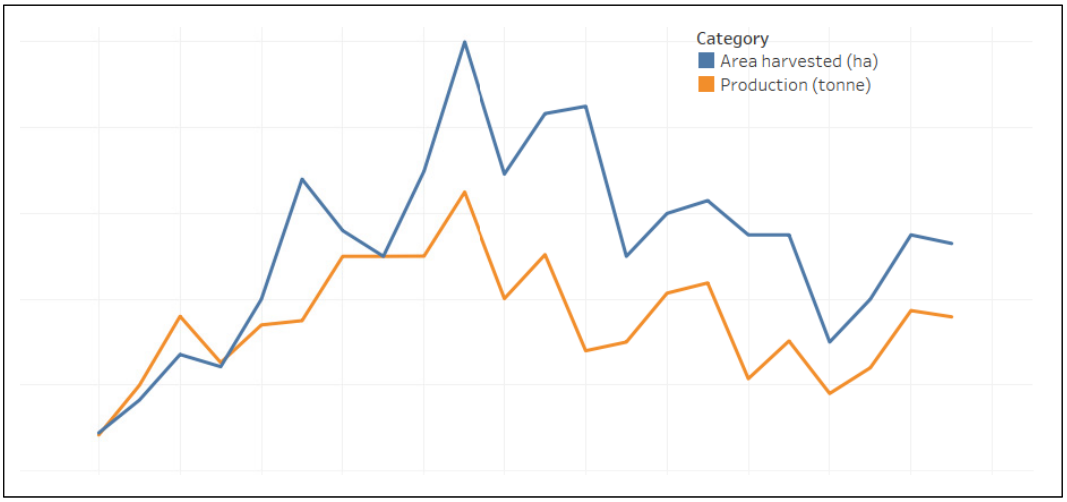
❍ The climate of Paraguay is of the subtropical type, with warm winters from May to August and very hot summers from November to March.

❍ The sesame cultivation is carried out from September to February, as shown in Figure 6, and since the 2000s, the sesame cultivation area has increased as an alternative income crop, but since 2010 it has been showing a decreasing trend.

❍ The production follows a similar trend to the cultivation area, and the unit yield has also been stagnant or decreasing.

❍ In the context of more than 80% of the sesame produced in Paraguay being exported, it is important to increase productivity in order to gain price competitiveness.[2)]

〈Figure 4〉 Sesame Production and Area harvested in Paraguay



Source: FAOSTAT (http://fao.org/faostat/en/#data, 2023. 2)

〈Table 5〉 Status of Farmers' Organizations in project regions

Department	CDA*	District	Number of Organizaions	Nuber of Farmers
Concepción	–	Concepción	47	850
		Belen	30	515
		Pitchfork	91	1693
		Loreto	39	604
		Yby Yau	15	295
		Arroyito	57	752
		San Alfredo	6	77
		Sergeant Jose F.Lopex	2	79
		Azotey	22	470
San Pedro	Norte	Ycuamandyyu	104	2459
		Antequera	16	246
		Chore	25	515

2) FAOSTAT(http://fao.org/faostat/en/#data, 2023. 2)

Department	CDA*	District	Number of Organizaions	Nuber of Farmers
		Lima	9	296
		Nueva Germania	16	469
		San Pablo	20	320
		Tacuati	11	279
		Gral Resquin	13	275
		Santa Rosas Aguaray	25	995
		Liberacion	23	546
		San Vicente Pancholo	21	395
	SUR	Ycuamandyyu	6	134
		Gral Aquino	34	717
		Itacurubi Del Rosario	23	423
		San Estanislao	35	659
		Union	8	184
		De Diciembre	7	240
		Villa Del Rosario	10	199
		Yataity Del Norte	17	413
		Guayaibi	17	476
		Capiibary	22	463
		Yrybucua	12	329
Total			793	16367

* CDA = Certificado de depósito de ahorro
Source: Dirección Nacional de Coordinación y Administración de Proyectos, internal data

2.1.5. Feasibility in Selection of Candidates

❍ Eligibility criteria

- Joint marketing experience
- Minimum amount of 30 partners
- Let sesame count as the main crop
- Linked to an agro-export company
- Legal documents for marketing (invoice, RUC, others).

〈Table 6〉 Contents by target area

Region	HQ or branches	Detailed contents of support	Direction
Concecion	Belen, Pitchfork, Yby Ya'u, Conception, loreto	• Provision of production inputs for 2,000 producers. • Provision of infrastructure and equipment for 15 organizations. • Provision of 5 packages of machinery and implements. • Training and technical assistance. • 3 technical facilitators for coordination and monitoring.	• Provision of inputs for 2 years of production and machinery and implements to improve yields. • Provision of infrastructure and equipment to improve the quality of the final product. • National and international technical training.
San Pedro	Saint Peter, Santa Rosa, Chore, Gen. Aquino, Release, New germania, Saint Paul, Tacuati	• Provision of production inputs for 1,000 producers. • Provision of infrastructure and equipment for 15 organizations. • Provision of 5 packages of machinery and implements. • Training and technical assistance. • 3 technical facilitators for coordination and monitoring.	
Total	13 districts		

2.2. Sesame value chain of production in San Pedro and Concepcion

❍ General Information of Interest

- In the Region Oriental, literally the Eastern Region, crop cultivation is developed in zones generally found distributed between gathering, trading centres, mainly in the departments of San Pedro and Concepcion, and in a lesser way, in the departments of Canindeyú, Caazapá and Itapúa. Within these last years, it has been expanding to the Chaco with the formal introduction of mechanised crop cultivation (Claudia et al. 2018).

❍ Input Distribution

- Seed stock: principal varieties, SH1, K2, INIA, K7 (recently developed and introduced through the IPTA of Chore), Escoba Blanca, which is being diminished in its use. Prepared seeds by the own producers. Uncertain purity given mixture amongst varieties through field testing results.
- Herbicides: For lean leaves only, and in some cases pre-emergent.
- Insecticides: Use in small doses, low incidence of plagues (worms)
- Fertilisers: chemical compounds with low usage, foliar fertilizer more frequent.
- Sieve (filtering) and packaging equipment provided by the companies without cost incurred.

❍ Raw Material Production.

- Individual producers, as well as those joined in Committees, Associations and Cooperatives. Conventional, semi-mechanised, organic seed stock production. The production mechanisms, as well as the commercialisation is operated throughout gatherers/collectors, whom deliver the necessary inputs, technical assistance and financing (soil readiness, agrochemicals, crop harvesting).
- In cases in which the production supersedes 400kg the seed stock cost is exonerated. It is worth mentioning that upon financing, collectors receive from interested companies monetary down payments, which generally are not sufficient to cover the necessary costs, therefore the same (collectors) find themselves in the imperious necessity of incurring other means of covering their expenses.
- Total pay-out of commodities is made in the farms proper, in cash, discounting the financial incentives done beforehand. Organic sesame market pricing has a plus of 1.000 PYG per kilo (0.14 USD as of 08/02/2023) and the sesame

seed usually generates about a 30% superior margin against market price, having to reach and 80% of germination to obtain extra payments.

- Average land surface oscillates between 1 and 3 has. Other income cash crops, such as cassava, maize, beans, Paraguayan lemon verbena (some areas). Visited zones tend to cultivate soy, propping itself as a substitute item of sesame. However, the sesame producer does not cultivate soy. Average yield (normal weather conditions) gravitates between 500 and 800 kgs/ha.
- Mechanised soil readiness (rented); manual and mechanised cropping with precariously adapted tools; generally do not using correctives of acidity; very low usage of chemical fertilisers; frequent usage of foliar manure; manual extraction of weeds, herbicide use for lean leaves; manual cutting and stooping; threshing, sieve and packaging in bags of 50 kg capacity.
- Commodities are later delivered in the farms to the collectors, receiving the payment in cash. In case of producers operating with associations or cooperatives, they receive an initial pre-arranged price in lieu of costs of production, later when the organisations finish the sales procedure with the agroexporting companies, an additional payment is made which is general above the payment done by the collectors.

❍ Gathering/collection

- The concentration, pilling up of commodities is done through by means of the collectors, whom sign formal contracts with particular companies; however, said collectors do not in turn fulfill contracts with the producers. Given the massive dispersion of the producers throughout the land, and the informal relation amongst collectors and producers (pacts of trust) it is difficult to assess the traceability and purity of the seed stock, as well as the fidelity of the end commodity commercialisation. Generally, it is the collector itself who man-

ages land conveyance to the trade centres , warehouses of the agroexporting companies properly. The collector in turn, fullfils an primary analysis (visual) of the quality of said commodities.

❍ Processing

- Processing includes cleanliness procedures (managning to obtain 99.9% purity) and further seed classifying is done by the agroexporting companies. Processing plants are equipped with state of the art, high precision machinery, many of them possessing optical selectors which manage to separate seeds by size and colour, to satisfy conditions of more demanding markets. The transformation of the commodities es minimal in by-products such as sesame oil, cookies, coffee, nougat, amongst others.
- Besides sesame, companies can count on the production/collecting of other items such as chia, maize, Paraguayan lemon verbena, livestock, soy.

❍ Main identified issues through managed interviews:

- Mixture of several varieties
- Loss of soil fertility
- Low usage of soil correctives and chemical fertilisers
- Lack of specific herbicides for further control of broad leaves
- Scarce usage of inputs in activities such as harvest, weed control and cutting
- Low participation of technical expertise assistants of the MAG
- Low participation of financial institutions (private, public banking) in tabled, formal proposals (investment, loans)
- Yield beneath the expected varieties potential

2.3. Necessity analysis by project activity

❍ Establishment of sesame production and processing facilities

- One of the needs identified through the Diagnosis of the chain was the lack of infrastructure owned by the organizations, where machinery can be installed, safeguard equipment and implements, in addition to the harvest to be sold.
- The buildings will be used as a deposit, place for cleaning, classifying and bagging sesame seeds, they will be equipped with a scale, grain cleaner and sieves.

❍ Support for equipment and material

- As for equipment and materials, tractors, harrows, subsoilers, grain cleaners, scales, sieves, manual seeders, humidity meter, among others, will be purchased.
- With respect to inputs, the acquisition of agricultural lime, sesame seeds, green manure seeds, pre-emergent and selective herbicide fertilizers and insecticides is planned.

❍ Invitational training in Korea and local training

- The training of technicians and producers at a national and international level is planned through this project, through the invitation to Korea.
- Capacity building activities are necessary to strengthen organizations, their management and the application of appropriate technologies for sesame production.
- Invitational training in Korea will be held for policy makers and technical officers.
- It is necessary to improve the effectiveness of this project, by strengthening technical capacity through local training for technical officials on production,

good agricultural practices, post-harvest management, organizational strengthening, and market insertion.

2.4. Technical·eonomic·socio-cultural feasibility

❍ Technical feasibility

- Agriculture is one of the most important activities in the Paraguayan economy and one of the longest traditions in the productive history of the country. The adoption of new technologies and management practices, the incorporation of agricultural machinery has generated a dynamic transformation.
- Meanwhile, although the Republic of Paraguay is the best place for sesame production with a suitable climate and cheap labor costs, it shows low productivity due to soil degradation and scarce technical assistance added to the weakness of the producer organizations.
- Sesame producer organizations and private companies such as Chungbo and Agronebay show willingness (interviews with MAG technicians and Kangwon National University representatives) to cooperate in the production and marketing of KO7 variety sesame developed by KOPIA.
- The sesame value chain will be strongly benefited through investment in the construction of infrastructure, acquisition of agricultural machinery and implements, as well as the provision of inputs that allow, on the one hand, to contribute to the recovery of soils and, on the other, that have an impact on directly in improving crop yields.
- Technology transfer through training will be crucial for the strengthening of producer organizations and for the creation of technical capacities in the Agricultural Development Centers and Local Technical Assistance Agencies.

- The project is consistent with institutional goals as well as is aligned with the National Development Plan of Paraguay.
- Paraguay identifies a highly relevant cooperation partner in Korea.

❍ Economical feasibility

- Sesame is a relatively new crop in Paraguay. It began in the 1990s at the initiative of the private sector and in 2007 Paraguay was positioned as the sixth largest exporter of sesame in the world. The crop has a great social impact since it involves many families of small producers.
- Sesame must be sustainable, both economically and environmentally and socially. In this sense, it is clear that no item can be competitive, nor can it function harmoniously, if one of the parts of the commercial chain is wrong. Therefore, the sustainability of sesame, like any other item, depends on a harmonious commercial chain.
- To continue growing both in volume and quality, technical assistance continues to be essential, especially for the dissemination of good practices that cultivation requires. The participation of the State, in harmony with exporters and producers, provides the necessary synergy and allows the application of a series of measures that guarantee the success of the sector in Paraguay.
- The private sector and the State play essential roles. The former look for businesses and form alliances with potential buyers; while the second trains, investigates, provides the necessary infrastructure and works on policies to produce according to demand.
- This project can significantly contribute to increasing the income of farmers through the improvement of productivity through the supply of technological packages, the strengthening of organizations and the provision of infrastructure and agricultural implements that allow optimizing the sesame production system in the Departments of Concepción and San Pedro.

❍ Socio-cultural feasibility

- It is expected that through the implementation of this project socio-cultural conditions will significantly improve, since the stratum mostly dedicated to sesame production comes from Peasant Family Agriculture, so the social and cultural effect will be positive, it would reduce the gap on income inequality and improve living conditions between urban and rural areas.

❍ Environmental feasibility

- The project will comply with national environmental regulations as established by the governing institutions of the matter, and given that the facilities to be installed and the production system chosen by national producers with a conservationist approach, will have little negative impact on the environment. environment, so it is not possible to identify possible environmental restrictions.

2.5. Willingness of recipient country

❍ The Ministry of Agriculture and Livestock of the Republic of Paraguay requested cooperation in relation to strengthening the competitiveness of the agricultural and forestry sector, having the serious conviction that investment in strengthening the capacities of Family Farming producers would directly result in the reduction of poverty, the generation of opportunities and the recruitment of labor.

❍ The initial ideas have been modified, anchoring these intentions specifically to the sesame value chain, taking into account all the experience of Korea in the development of the item, identifying them as potential partners.

❍ The diagnosis of the sesame value chain carried out by the joint research team between the MAG and the KNU was able to ratify with the analyzes carried out the weaknesses that must be worked on so that both the organizations and the value chain are strengthened.

❍ A no less important point was the ratification of the Minister of Agriculture and Livestock of Paraguay, Mr. Santiago Bertoni, who on the occasion of the welcome to the country of the experts from the Kangwon National University of the interest of the state portfolio in continuing with the Technical and Financial Cooperations from Korea.

2.6. Other considerations

❍ Sustainability

- Although sesame producers in Paraguay have been developing the field for several years, they do not have the necessary capital to invest in infrastructure, implements and inputs, which has resulted in the development of sesame in an inefficient manner. The objective of this project is to strengthen producer organizations by providing them with infrastructure, agricultural machinery and implements, cleaning equipment, and grain classification that can help producers improve their performance and provide companies with a clean product that is better paid, thus obtaining an improvement in their income and thus ensuring the sustainability over time of optimized production.

❍ Regional development

- It is expected that, by improving the income of sesame-producing families,

producers in the area decide to expand the production areas and add more members to the beneficiary organizations of the project, which will directly inject more money in circulation. in production regions, promoting the development of other indirect beneficiaries such as freight forwarders, service stations, agroveterinarians, etc. In addition, it is possible to establish that there will be a greater availability of seed of the KO7 variety so that other producers can easily acquire it and guarantee varietal purity.

❍ Gender

- It is known that the role of rural women in organizations is of great importance and that currently there is a large percentage of women heads of households and managers of farms, so in this project the Sustainable Development Goals will be kept in mind 5, Gender equality, SDG 8, decent work and economic growth, based on equal opportunities to be beneficiaries whether men or women.

❍ Linkage with related organizations

- Currently in Paraguay there are projects underway through the support of international cooperation, either as financiers, as is the case of the Natural Resources Management Project financed by the German bank (KWF) through loans, or the case of the Agricultural Mechanization Project with funds from the Paraguayan state but executed through implementing partners (UNOPS). Currently, there are also projects to strengthen tomato value chains, the dairy chain, and the pork chain through JICA financing.

3 Analysis of Project Contents

3.1. Project goal(short-term/mid-term/long-term) and means of achievement

❍ Project goals and means of achievement

〈Table 7〉 Project goals and means of achievement

Division	Goals and details by cycle		
Long term goal	• Improve the economic income of sesame producers in the Departments of San Pedro and Concepción	Strategy	• Stable performance of sesame production
	• Make investments in infrastructure, equipment and inputs for production • Obtaining production improved in its performance and quality.	Direction	• Establishment of infrastructures on properties belonging to producers' organizations

Mid-term goal	• Improvement of productivity of sesame in the Departments of Concepción and San Pedro	Strategy	• Technology training about sesame production • Establishment of producers' association
	• Establishment of producers' organizations focused on improving sesame production technology. • Promotion of the improvement of the quality and productivity of sesame production farms	Direction	• Training of specialists in sesame production to provide technical assistance to local producers. • Training on sesame production for producer organizations. • Invitational Training in Korea
Short term goal	• Establishment of sesame production facilities.	Strategy	• Soil analysis in order to carry out the applications of inputs according to the needs of each production farm
	• Establishment of a sesame production system with the application of technology and inputs appropriate to the nutritional needs of each farm producer.	Direction	• Establishment of nutritional needs of the plots according to the results of soil analysis and the recommendation of agricultural correctives

3.2. Project components

❍ Review and suggestion of project components

〈Table 8〉 Review and suggestion of project components

Sector	Activities	Beneficiaries and target area	Direction
1. Establishment of production infrastructure	1.1 Establishment facilities for warehouses and rooms for cleaning machines, scales and sieves 1.2 Support for the acquisition of agricultural machinery and implements 1.3 Establishment of producers' organizations and geolocation of production farms	• Establishment of a cleaning, classification and deposit plant • Establishment of production farms for soil correction and preparation.	• Completion of the establishment of the public cleaning, sorting and storage facility • Supply of agricultural inputs for beneficiary organizations.
2. Capacity building	2.1 Local training for technical officials (operational training of seed processing facilities and equipment, training in	• Strengthening of the production and processing capacity for Technicians from the Agricultural	• Promote the strengthening of the sesame value chain through investments

Sector	Activities	Beneficiaries and target area	Direction
	sesame production technology) 2.2 Local training for sesame farmers 2.3 Invitational Training to Korea for Policy and Technical Officials (Policies and Systems Related to Sesame Production	Development Centers and Local Technical Assistance Agencies. • Farmers members of the selected productive organizations • Technical and policy officers at the central and local levels	in infrastructure, agricultural inputs and training

3.3. Analysis of stakeholders/SWOT/environmental & social impact

3.3.1. Analysis of stakeholders

○ Establishment of sesame production and processing facilities

〈Table 9〉 Analysis of stakeholders for strengthening the sesame value chain in small-scale producers in Paraguay

Stakeholders		Ratio		
		+	0	-
Direct beneficiaries	Producers members of sesame production organizations	+		
	Technicians from the Ministry of Agriculture and Livestock	+		
Indirect beneficiaries	Freight forwarders, service stations, local businesses, etc.		0	

○ Capacity building to increase in sesame productivity

〈Table 10〉 Analysis of stakeholders of capacity building

Stakeholders		Ratio		
		+	0	-
Direct	Sesame Producers' Organization	+		

Stakeholders		Ratio		
		+	0	–
beneficiaries	• Companies dedicated to the purchase and marketing of sesame. • Technicians from the Ministry of Agriculture and Livestock	+		
Indirect beneficiaries	Freight carriers, stevedores, service stations, general trade	+		

3.3.2. SWOT Analysis

○ For the SWOT analysis, the feasibility study team carried out an analysis of the sesame value chain, the national and international market conditions, and the current state of the chain, in order to increase production and marketing volumes in Paraguay.

〈Figure 5〉 SWOT analysis

Strengths	Weaknesses
• Agro-ecological conditions that allow organic production. • Possibility of crop rotation (in oil sesame) • Varieties adapted/drought tolerant • Sufficient capacity of freight services for the collection of the product • Organic products • Presence of consolidated companies that support marketing • KAPEX presence • International cooperation	• Low quality and crop productivity, mainly sesame • Scarce presence of official institutions for technical, financial and research assistance • Little practice of crop rotation (mainly confectionery sesame) • Post harvest handling • Market pricing • Mix of varieties • Lack of differentiated tariff code between varieties/uses • Some lack of knowledge on appropriate practices for the use of pesticides (doses, times) • Lack of communication and coordination between the actors in the chain
Opportunities	**Threats**
• Expansion of international markets. • International expansion of demand for organic products. • Availability of family labor with production capacity of the item. • Existence of producer organizations • MAG's experience in similar projects (PPI, PIMA, PROMAFI) with international organizations KOICA, FIDA, WB, IDB, GIZ, JICA.	• Production growth in Brazil and other countries (Africa, India). • High price of commodities • Severe adverse climatic factors (mainly droughts) • Presence of pests and diseases in plants (macrophominia, worms) • Competition in land use by other agricultural items (commodities)

3.3.3. Analysis of environmental & social impact

❍ Establishment of facilities supported through this project is carried out by providing additional support to facilities and sites that are already used for the same type of use, so the negative impact on the natural environment is extremely small. Likewise, the size of the planned work does not meet the standards required for the establishment of environmental and social management plans in international cooperation projects.

❍ However, the necessary compliance with the management of a Strategic Environmental License has been established as a prerequisite for the approval of investment projects as established by national regulations. It is also worth mentioning that the production approach to be implemented through this project will be through soil conservation practices, which is somehow aligned with adaptation actions to the effects of climate change.

3.4. PDM (Project Design Matrix)

❍ Project name: Strengthening of the sesame value chain in small-scale farmers in Paraguay

〈Table 11〉 PDM of the project

Narrative Summary	Indicators(OVI)	Methods of verification(MoV)	Important Assumptions
Overall Goals			
Improvement of the productivity of sesame cultivation through the application of	Increase in crop yield per productive unit	* Quantity of kilograms per hectare of sesame produced * Acts of delivery of	1. Continuous monitoring from state institutions linked to the project.

Narrative Summary	Indicators(OVI)	Methods of verification(MoV)	Important Assumptions
technological packages and training.		inputs	
Outcomes			
1. Increase in the income of the producers who are members of the organizations benefited by the project,	1.1. Producers receive better financial compensation for an improved production and quality of products	* Comparison of prices for products delivered to the plant of producers benefiting from the project and non-beneficiary producers	1. Continued agricultural support from central/local governments 2. Management of facilities and systems of implementing agencies and related organizations in Paraguay
Outputs			
1. Establishment of production facilities, cleaning and storage of sesame seeds and delivery of agricultural machinery and inputs	1.1. Facilities completed with sorting and cleaning equipment installed. 1.2. Machinery and agricultural inputs delivered to the organizations	* Baseline & endline survey report * Field Survey Report * Project periodic report	1. Timely input of budget and experts 2. Implementation of qualitative activities
2. Development of capacities to improve productivity in sesame cultivation	2.1. Training for technicians and producers at the local level 2.2. Satisfaction with invitational training in Korea	* Baseline & end line survey report * Field Survey Report * Project periodic report	
Activities	**Inputs**		**Pre-Condition**
1. Establishment of facilities related to sesame production. 1.1. Establishment of sesame sorting, cleaning and storage facilities. 1.2. Support with the provision of agricultural machinery and inputs. 2. Local training for technicians and	[Korea] ◦ Input of budget : 5 million USD ◦ Input of experts * Input from sesame value chain experts. * Provision of facilities and machinery (scale, cleaner, sieves) * Sesame value chain expert shipping. * Invitation to Korea for Technicians and policy level. [Paraguayan] * Identification of the organizations to be benefited. * Appointment of technicians to be trained in the framework of the project. * Designation of the Executing Unit of the Project. * Carrying out the necessary procedures for the		1. Identification of the producing organizations and the properties where the infrastructure and machinery will be installed. Identification of technicians and farmers. 2. Review of budgets for agricultural machinery and inputs. 3. Identification of

Narrative Summary	Indicators(OVI)	Methods of verification(MoV)	Important Assumptions
farmers to be benefited by the project. 3. Invitational training in Korea for policy and technical officers.	execution of the project.		technicians to be trained in sesame value chains. Attitudes of the receiving country for the establishment of a fluid cooperation system for the implementation of the project and the participation in the project.

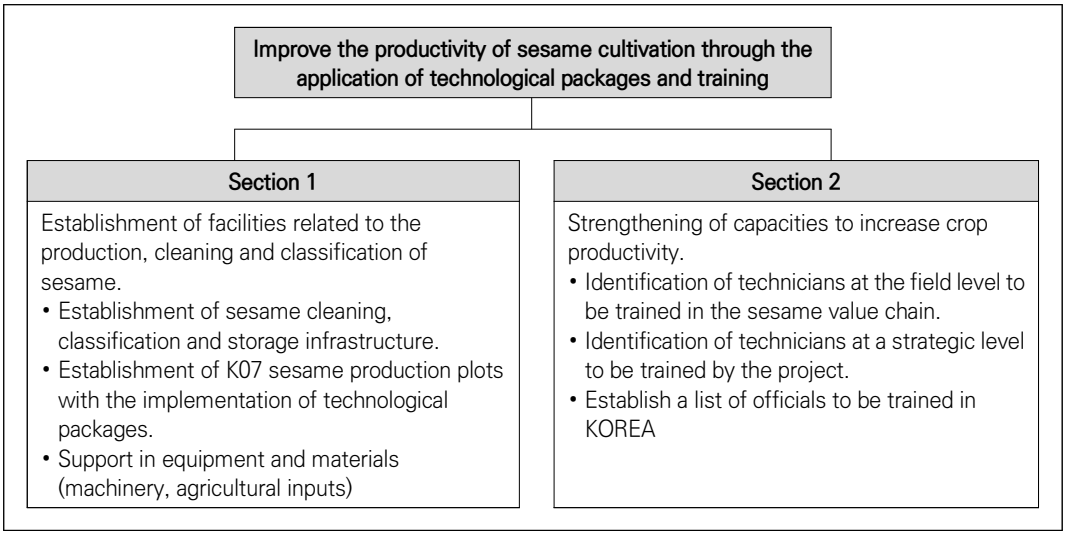
4 Project Implementation Plan

4.1. Basic direction/scheme of project management and implementation

4.1.1. Basic Direction

❍ This project is divided into provision of inputs and equipment, construction of infrastructure (Sector 1) and development of capacities (Sector 2) in order to improve the yields obtained in production.

〈Figure 6〉 Basic direction of the Project to Strengthen the Sesame value chain for small-scale farmers in Paraguay



4.1.2. Scheme of project management and implementation

❍ The (general) objective of the project is to improve the income of (specific) producers through the installation of a management model that contemplates the incorporation or improvement of production technology and yields (1) that includes the K07 variety and post-harvest management that ensures quality (2), in alliance with associated producers from the departments of San Pedro and Concepción.

❍ It will provide inputs, infrastructure, equipment, machinery, training and technical assistance necessary for the production, collection and commercialization of sesame, in order to produce grains with high purity for direct commercialization to agro-export companies.

❍ The organizations must have at least 30 members, and must be linked to an agro-export company interested in marketing sesame of the K07 variety.

- Component 1. Provision of agricultural inputs
- Component 2. Provision of infrastructure, equipment, machinery
- Component 3. Training and technical assistance. Operating expenses.

❍ The project will be implemented through the Ministry of Agriculture and Livestock of Paraguay, through the Project Execution Unit generated exclusively for it, will have the support of experts from Korea and technicians from the Directorate of Agrarian Extension with their Agricultural Development Centers in the area of influence of the project.

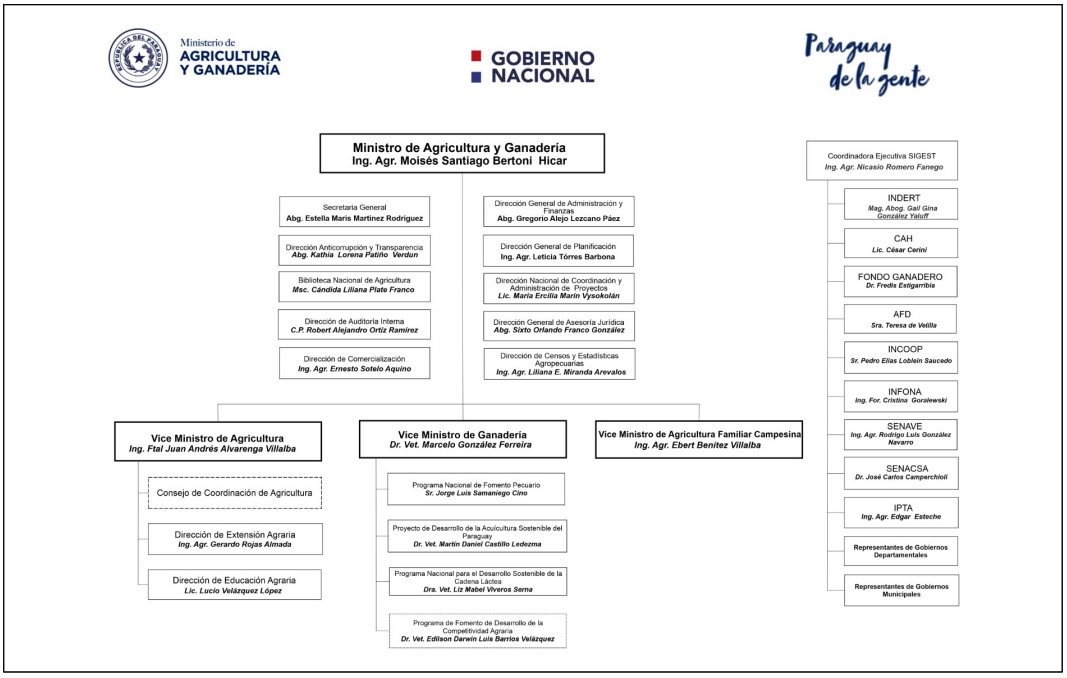
❍ The general coordinator of the project will be appointed by the Ministry of Agriculture and Livestock of Paraguay.

❍ Korean experts will be present to support its implementation.

❍ The Korean counterpart will be able to support with the budget, the management of the project, the management of experts for support, production of materials, training of local technicians.

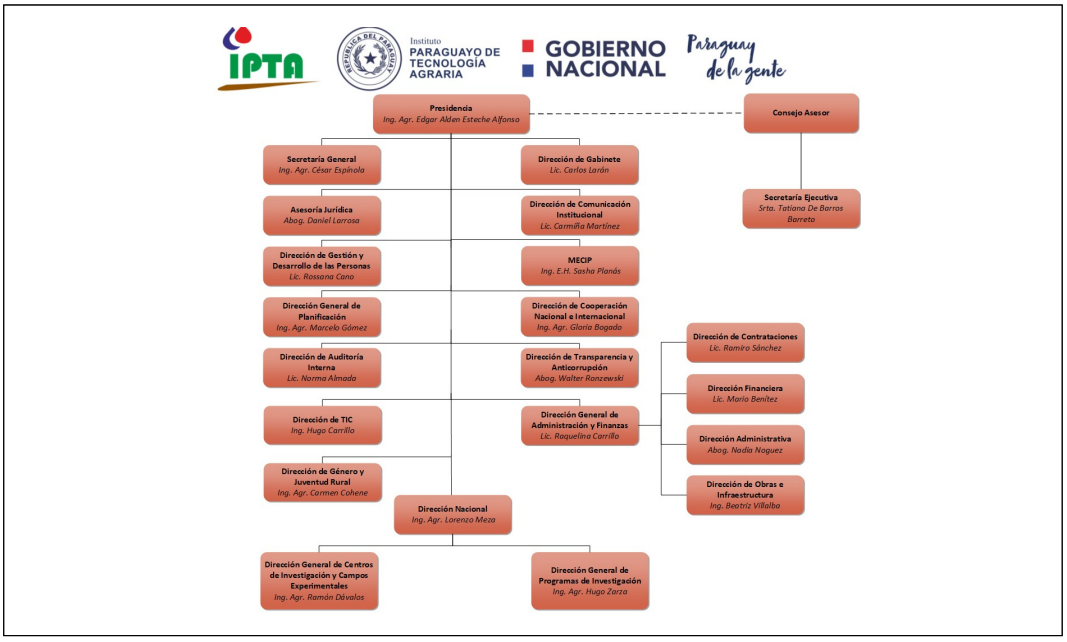
❍ While the MAG of Paraguay and IPTA will be in charge of operations at the field level, crop planning, infrastructure installation, operation and management of equipment and materials and supplies. The division of tasks between both countries will be as follows.

〈**Figure 7**〉 Organization Structure of MAG



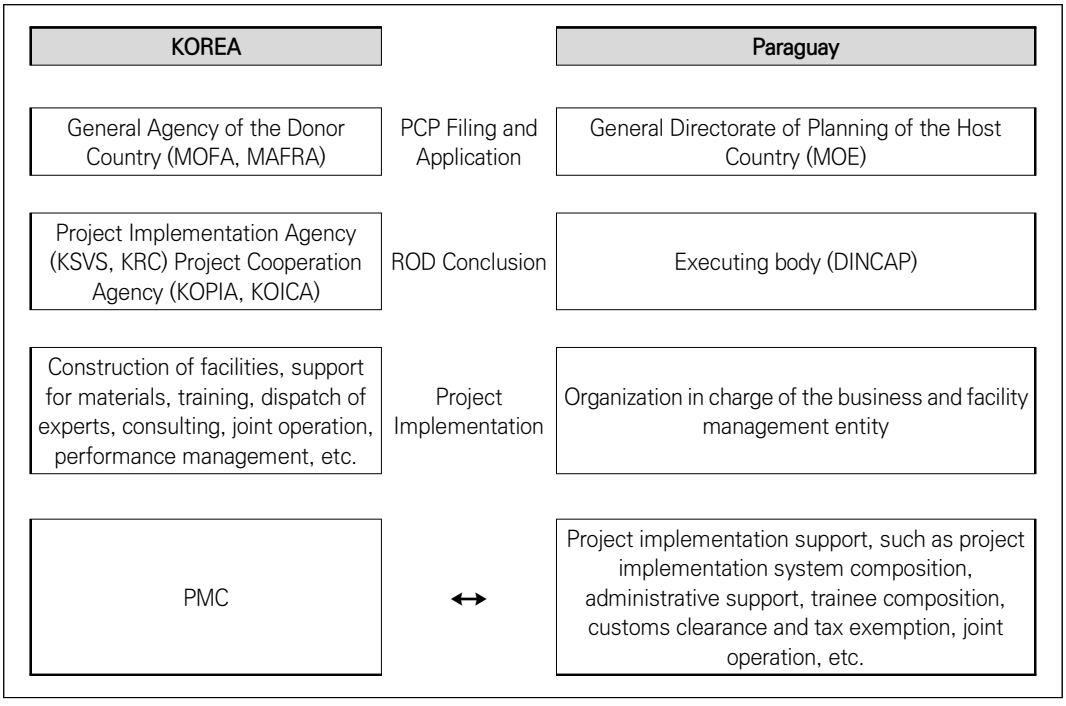
Source: MAG official website(https://www.mag.gov.py/index.php/institucional/organigrama, 2022. 2)

〈**Figure 8**〉 Organization Structure of IPTA



Source: IPTA official website(https://www.ipta.gov.py/index.php, 2022. 2)

〈Figure 9〉 Project Implementation System



〈Table 12〉 Items to be shared by project between countries

Country	Activities	Contents
Korea	Establishment of Infrastructure	• Establishment of production and sorting, cleaning and storage facilities
	Support for equipment and agricultural inputs	• Farm machinery, testing equipment, vehicles, office supply etc. • fertilizers, agrochemicals
	Expert dispatch	• Totally 4 persons
	Invitational training in Korea	• Policy-level officials : 15 persons, 7 days, 1 time • Technical officials : 15 persons, 7 days, 2 times
	Local training	• For technical officials of the Ministry of Agriculture and Livestock
	Local recruitment	• Totally 4 persons
	Others	• Preliminary survey and implementation consultation, performance management, etc. (Baseline/ midline/ endline survey)
Paraguay	Support for the project implementation organization and administration	• To install PO (Project Office) • To appoint a Project Coordinator and support for the project preparation and implementation • To provide qualified counterparts to support for the peoject implementation and the activities of Korean expers. • To bear the recipient country's project-related staff and basic budget

Country	Activities	Contents
	Support for Korean expers	• To guarantee the safety of Korean experts and emergency rescue if necessary • To provide statistical data such as projet-related data • To support for office space, OA and assistant manpower such as office workers
	Support for the project implementation	• To conduct the approval by government agencies in all procedures necessary from investigation for project execution to completion of the project and the issuance of licenses, etc. • To acquire and compensate of all land for project implementation, and settlement of civil complaints • To provide all related date necessary for design and construction, etc.
	Support for equipment and material	• To exempt from all taxes on all equipment, such as equipment and vehicles, provided by the Korean side for project implementation • Prompt handling when unloading and customs clearance of equipment • After completing the project, to bear the maintenance, repair, and management costs of equipment
	Invitational training in Korea	• All support for selecting trainees and leaving Korea

4.2. Baseline & endline survey plan/Performance management plan/Indicators

4.2.1. Baseline & endline survey plan

❍ Project formation scenery (baseline survey)

- In the project formation stage, the performance management team within the PMC will conduct a baseline survey.
- Precise analysis of the demands of the beneficiaries, *consensus on the objectives of the project between the owner of the project and the executing entities, *derivation of priorities for the implementation of the project, and *consensus on the agreed performance indicators.

- For stakeholder analysis, a workshop involving stakeholders from the recipient country will be held at the initiation stage.

❍ Project implementation scenery (middle line survey)

- At the project implementation stage, the performance management team within the PMC will conduct a midline survey.
- During performance management field trip planned each year, the performance management team will *verify the project site, *measure progress, and *measure performance.
- Through the above activities, the team will judge whether the project is being carried out according to the goal and purposes, and will present countermeasures to the project implementation team when problems or variables arise.
- By conducting field studies, the team will educate the person in charge of the facility's operation on how to measure performance and build capacity so that beneficiaries can measure performance over the long term.

❍ Project Completion scenery (end line survey)

- 1 year after the end of the project, the final survey will be conducted and the project implementation team will obtain exit strategies in consultation with the PSC.
- Through the final survey, the performance management team will investigate to confirm whether the project has achieved its goals and objectives.
- Regardless of the successful completion of the project or the poor achievement of the objectives, it is necessary to increase the independence and sustainability of the beneficiaries proposing additional inputs necessary to achieve the objectives.

4.2.2. Performance management plan

❍ Performance management of this project should be carried out by PMC and the MAG team of the beneficiary organization.

❍ In the case of PMC, the performance management plan will be established in the initial stage of the project with PM, and seed production/management experts, who are the project management team, and will be investigated periodically (twice a year) and modified.

4.2.3. Indicators

❍ From the inception stage, the data source must be verified to measure performance indicators, a baseline survey must be conducted, and a post-evaluation must be prepared after the project is completed.

〈Table 13〉 Outcome indicators

Project purpose	Outcome indicators	Methods of verification(MoV)
Increased productivity and income of sesame producers benefited from the project	• Quantity of kilograms per hectare produced on the farms of the benefited producers. • Price paid per kilogram of sesame free of impurities.	• Comparative considering the baseline determined in the Diagnosis of the value chain. • Initial and final surveys • Technical reports • Regional statistics

〈Table 14〉 Output indicators

Outputs	Output indicators	Methods of Verification (MoV)
1. Establishment of infrastructures and machinery	1.1. Facilities completed with sorting and cleaning equipment installed. 1.2. Machinery and agricultural implements delivered to the organizations	• Infrastructure delivery minutes to the organization • Records of machinery deliveries. • Minutes of delivery of machinery and implements

Outputs	Output indicators	Methods of Verification (MoV)
2. Capacity building to improve sesame productivity	2.1. Training for technicians and producers at the local level 2.2. Satisfaction with invitational training in Korea	• Training compliance certificates • Local training programs • Training program in Korea

4.3. Project budget plan

○ Component 1. Provision of agricultural inputs (3,000 hectares)

- Amendment and Fertilization: it must be carried out to all the partners. Application and incorporation of agricultural dolomitic lime and fertilizer 12-15-15.
- Sowing: use of improved seeds with proven varietal purity, obtained from the KOPIA-IPTA Choré Cooperation, it is sesame of the K07 Variety of short cycle. Soil preparation will be done using machinery and implements, at the expense of the producers. Sowing will be done using fine grain seeders. Resulting in a good plant density.
- Cultural and Health Care: It will be done through manual weeding, chemical herbicides will be used for weed control. For pest control, most of the allowed defenses in the field are used, under technical assistance for effective pest control.

〈Table 15〉 Provision of inputs for production with the project

Description	Unit of measurement	Amount	Unit cost	Total cost/ha,	Cost (USD)	Cost/ 1000ha	Cost/ 2 years
1. Soil analysis	analysis	1	100,000	100,000	14	13,699	13,699
2. Agricultural lime	kg	1,500	600	900,000	123	123,288	123,288
3. Seed	package	1	70,000	70,000	10	9,589	19,178
4. Fertilizers							

Description	Unit of measurement	Amount	Unit cost	Total cost/ha,	Cost (USD)	Cost/ 1000ha	Cost/ 2 years
4.1. 12-15-15	bag	2	450,000	900,000	123	123,288	246,575
4.2. Foliar	liter	0.5	90,000	45,000	6	6,164	12,329
5. Herbicide							
5.1. Pre-emergent	liter	1	85,000	85,000	12	11,644	23,288
5.2. Selective	liter	2	80,000	160,000	22	21,918	43,836
6. Benzoate (Insecticides)	liter	0.1	750,000	75,000	10	10,274	20,548
7. whitewashed	chance	1	500,000	500,000	68	68,493	68,493
Total cost in dollars					388	388,356	571,233

* USD = 7,300 Gs

❍ Component 2. Provision of infrastructure and equipment (20 organizations and 13 districts)

- For sesame, a higher purity of the final product (99% purity) will be achieved through the pre-cleaner/classifier. To date, it is done with a pre-cleaner, leaving 95% purity. This will achieve higher prices, and also the possibility of associating with other nearby organizations for the realization of joint sales and achieve a volume that translates into better final prices.
- The collection of the product must be done under a control scheme at the source, individualizing each producer who delivers his product to the warehouse with a code, as part of an initial traceability process. It will be done through the use of the producer's vehicle, and the producers accompany the load to be able to know the final volume delivered, once the grains have passed through the pre-cleaner. The waste generated in the pre-cleaning, sand and vegetable residues is delivered to the producer for use on the farm as organic matter to be incorporated into its soil.
- Benefit: It is the most important activity in the chain, due to the added value it generates and its direct implication on the proposed business. It includes the following process: (i) reception of the product at the processing plant, (ii)

cleaning, which consists of the separation of foreign bodies (organic waste, sand, metals, etc) to achieve 99.98% purity, free of metals, (iii) final bagging in 40 kg bags and (iv) storage, waiting for shipment to the final destination.

- Once the entire production has been collected, the commercialization will be carried out with the Agroexport Company, with which a previous contract must be counted. The company will be in charge of picking up the product from the organization's premises.

〈Table 16〉 Provision of infrastructure and equipment for 1 producer organization (Total 20 organizations)

Description	Unit of measurement	Amount	Unit cost	Total cost	Cost (USD)
Deposit	m2	250	1,500,000	375,000,000	51,370
Fine grain cleaner	unit	1	75,000,000	75,000,000	10,274
Weighing machine	unit	1	6,000,000	6,000,000	822
screens	unit	100	360,000	360,000,000	4,932
humidity meter	unit	1	3,600,000	3,600,000	493
Total cost in dollars					67,898

* USD = 7,300 Gs

〈Table 17〉 Provision of machinery and implements for 1 district (Total 13 districts)

Description	Unit of measurement	Amount	Unit cost	Total cost	Cost (USD)
Tractor	unit	1	385,000,000	385,000,000	52,740
Dredge	unit	1	55,000,000	55,000,000	7,534
subsoiler	unit	1	35,000,000	35,000,000	4,110
Total cost in dollars					64,384

* USD = 7,300 Gs

❍ Component 3. Training and Technical Assistance.

- Hiring of 6 technicians (3 San Pedro - 3 Concepción) for 6 months, in 4 years, with their own mobility.

- Training of project technicians, technicians from DEAg, technicians from companies.
- International training.

❍ Total Budget

- Component 1. Provision of production inputs (3,000 hectares) = 1,713,699 USD
- Component 2. Provision of infrastructure and equipment (20 organizations and 13 districts) = 1,357,960 + 836,992 = 2,194,952 USD
- Component 3. Training and technical assistance = 500,000 USD
- Administrative expenses = 591,349 USD

〈Table 18〉 Estimated budget by project sector and subsector

Unit: millions of dollars

Component	Description	USD amount	%
Component 1	Provision of productive inputs for 3,000 hectares	1,713,699	34
Component 2	Provision of infrastructure and equipment (30 organizations and 13 districts)	2,194,952	44
Component 3	Operating expenses of the Project Executing Unit	500,000	10
Administrative expenses		591,349	12
Total		5,000,000	100

❍ Producer's counterpart: Labor, soil preparation, transport to the collection center.

❍ Observations:

- Budget subject to exchange rate and price variation.
- In case of any remaining balance, it will be reallocated to Component 1.

4.4. Detailed plan by activity

❍ Establishment of facilities

- Equipment: As planned, with the implementation of this project, 20 organizations will be provided with the provision of a fine grain cleaner, scales, sieves, and humidity meters.
- Inputs: Inputs such as seeds, fertilizers, herbicides (pre-emergent and selective), insecticides and agricultural correctors (agricultural lime) will be provided to the organizations during the first two years of project execution. It is expected that once this time has elapsed and through the improvement of the producers' income, they will have the capacity to sustain the acquisition of inputs for future seasons over time.
- It is important to establish that in order for organizations to access the provision of inputs, they must first submit their plots to soil analysis in order to determine their nutritional requirements and be able to count on advice for soil management, conservation and recovery. of said productive units.

❍ Strengthening agricultural ability

- (Expert Dispatch) Experts in sesame production will be sent with small producers, to provide training on production technologies for technical personnel.
- (Local training for technicians officials) Technicians from the Agricultural Development Centers and Local Technical Assistance Agencies of the DEAg -MAG will be trained in order to provide permanent and specialized technical assistance in the field
- (Local training for farmers) Local training will be carried out for farmers from

20 productive organizations. The content of the training will include technical training in sesame production, good agricultural practices, management, conservation and recovery of soils, post-harvest management, in addition to those that serve to strengthen organizations and insertion into value chains.

- (Invitational training in Korea) Invitational training in Korea will be operated bimodal for 7 days (including arrival and departure) for 15 political level officials and 15 technical officials in 2024 (1st year), for 7 days for 15 technicians

4.5. Detailed project schedule

❍ The project period is 3 years (2024~26 years), and the detailed project schedule is shown in the following table.

〈Table 19〉 Detailed project schedule

Division	Preparatory stage		2024				2025				2026			
			1/4	2/4	3/4	4/4	1/4	2/4	3/4	4/4	1/4	2/4	3/4	4/4
1. Preliminary survey														
2. Implementation consultation, ROD exchange														
3. PMC Selection														
4. Sending experts														
5. Identification and selection of producer organizations														
5.1. Establishment and construction of infrastructures (deposits)														
5.2. Establishment of productive farms														

Division	Preparatory stage		2024				2025				2026			
			1/4	2/4	3/4	4/4	1/4	2/4	3/4	4/4	1/4	2/4	3/4	4/4
6. Planting														
7. Capacity building														
7.1. Local training of DEAg CDA and ALAT technicians														
7.2. Local training for farmers belonging to the selected organizations														
7.3. Invitational training in Korea														
7.4. Workshop														
8. Monitoring and evaluation			base line							Mid line				End line

5 Monitoring and Evaluation Plan

5.1. Monitoring and evaluation plan

5.1.1. Monitoring and evaluation system

❍ For the monitoring and evaluation of the project, Paraguay will designate the officials of the Project Execution Unit in addition to the technicians of the Management and Monitoring of the General Directorate of Planning of the MAG and IPTA.

❍ Progress, mid-term and project closure evaluations will be carried out.

❍ The exchange of information on the monitoring results with the executing agencies of both countries is planned.

❍ Quarterly progress reports, budget execution and processes of plans presented will be used for monitoring.

❍ The monitoring and evaluation results will be reported to each project entity for feedback and each project entity will take steps to reflect the project results.

5.1.2. Monitoring and evaluation plan and indicators

❍ For monitoring and evaluation, a baseline diagnosis will be carried out at the project formation stage, a midline survey at the intermediate stage of project implementation, and a final survey within one year after project completion. (3 times in all).

❍ Monitoring and evaluation aim to verify whether the plan and the implementation are carried out correctly according to the purpose of the project. Monitoring and evaluation indicators are classified into results and indicators.

5.2. Establishment of environmental & social management plan

❍ The project will be fully governed by the environmental regulations in force in the Republic of Paraguay, Environmental Impact Studies will not be required because the negative impact on the natural environment is extremely small. Likewise, the size of the planned works do not meet the standards required for the establishment of environmental and social management plans in international cooperation projects.

6 Conclusion

❍ The (general) objective of the project is to improve the income of (specific) producers through the installation of a management model that contemplates the incorporation or improvement of production technology and yields (1) that includes the K07 variety and post-harvest management that ensures quality (2), in alliance with associated producers from the departments of San Pedro and Concepción.

❍ The project is consistent with the Institutional Strategic Plan and therefore seeks to “Expand exports of agricultural products and increase the income of agricultural households” through the strengthening of the sesame value chain focused on small-scale producers in Paraguay.

❍ The problems in the sesame industry are identified as 1) insufficient sesame cultivation technology, and 3) lack of infrastructure for classifying and cleaning the product to be delivered to sesame purchasing and processing companies.

❍ Therefore, it is expected that the implementation of this project will help to 1)

Strengthen the organizations of sesame producers, 2) Provide the necessary infrastructure to obtain a product of good quality and free of impurities, which 3) positively influence in the price of the product and help improve the income of small-scale producers dedicated to the production of sesame in Paraguay.

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