

## 終了時評価結果要約表（英文） Summary of the Terminal Evaluation

<b>1. Outline of the Project</b>		
<b>Country:</b> Republic of Colombia		<b>Project title:</b> Project for Development and Adoption of Latin American Low-input Rice Production System through Genetic Improvement and Advanced Field- Management Technologies
<b>Issue/Sector:</b> Agriculture/ Forestry/ Fisheries- Agriculture- Agriculture/ General		<b>Cooperation scheme:</b> Technical Cooperation Projects (SATREPS)
<b>Division in charge:</b> Rural Development Department		<b>Total cost:</b> JPY390,000,000
<b>Period of Cooperation</b>	From May 5, 2014 to May 4, 2019 (5 years)	<b>Partner Country's Implementing Organization:</b> (1) Responsible organization: Ministry of Agriculture and Rural Development (MADR) (2) Implementing organization: MADR, CIAT, FEDEARROZ, FLAR, and UNIVALLE
		<b>Supporting Organization in Japan:</b> None
<b>1-1. Background of the Project</b>		
<p>Agriculture is one of the crucial sectors for Colombia and rice is considered to be a major crop in Colombia. Rice occupies the third largest cultivated area after coffee and maize. The rice production has been exceeded 2.5 million tons since 2007, which was the forth in the American continent following the United States of America, Brazil and Peru. However, the rice consumption exceeded production and therefore Colombia imported 150,000 tons in 2011. The cheaper rice produced in the United States of America might surpass Colombian one in the near future, as the Government of Colombia has signed the Free Trade Agreement with the United States of America in 2012.</p> <p>In response to such situation, since 2011, Ministry of Agriculture and Rural Development (MADR) has proposed Rice Producing Plan in close relation with National Federation of Rice Growers (FEDEARROZ), International Center for Tropical Agriculture (CIAT), Colombian Research Corporation for Agriculture and Livestock and private rice millers.</p> <p>The Government of Colombia, in coordination with CIAT and FEDEARROZ, has requested a joint research project (the Project for Development and Adoption of Latin American Low-Input Rice Production System through Genetic Improvement and Advanced Field- Management Technologies, herein after referred to as “the Project”) under the Science and Technology Research Partnership for Sustainable Development (SATREPS) Program under the framework of Technical Cooperation of the Government of Japan.</p> <p>Record of Discussions (R/D) was signed in February 2014 and this Project started May 2014 as 5-year project.</p>		
<b>1-2. Project Overview</b>		
<p>This Project aims to develop resource-efficient rice production technics by developing new breeding lines with higher water and nitorogen use efficiencies, resouce-efficient crop management strategies, and water-efficient production system.</p>		

### **(1) Overall Goal**

The resource-efficient rice production techniques developed in the project are disseminated to agricultural producers in Colombia and Latin American countries.

### **(2) Project Purpose**

Resource-efficient rice production techniques and their implementation methods suitable for Colombian environment are developed.

### **(3) Outputs**

- 1) The new breeding lines with higher water and nitrogen use efficiencies will be developed.
- 2) The resource-efficient crop management and fertilization strategies will be developed at the farm scale.
- 3) The water-efficient rice production system will be established at the watershed scale.
- 4) The trial results from the precision agriculture experiments will be integrated and a practical system for technology transfer and capacity building will be established.

### **(4) Inputs**

**Japanese side:** Japanese Expert: Three long-term experts (2 project coordinators and one long-term research expert) and 17 short-term experts (researchers) in total. Trainees received in Japan: Three persons for training Japan (6 times in total) and 33 persons for short research visit in total. Provision of equipment: US\$851,124. Local cost expenditure: approx. US\$779,000.

**Colombian side:** Counterpart 25 persons (at the terminal evaluation). Equipment: US\$250,292. Local Cost: approx. US\$862,695. Provision of land and facilities: Office spaces for Japanese researchers/expert, experiment fields, green houses, and laboratories, etc.

## **2. Evaluation Team**

<b>Members of Evaluation Team</b>	(1) Japanese side
	<ol style="list-style-type: none"><li>1) Leader: Mr. Keisuke Ito, Director of Team 3, Agricultural and Rural Development Group 2, Rural Development Department, Japan International Cooperation Agency (JICA)</li><li>2) Cooperation Planning: Ms. Maho Chujo, Assistant Director, Agricultural and Rural Development Group 2, Rural Development Department, JICA</li><li>3) JST Leader: Dr. Shuichi ASANUMA, Research Supervisor, Dept. of International Affairs (SATREPS Group) , Japan Science and Technology Agency (JST)</li><li>4) Cooperation Planning: Dr. Kensuke KODAIRA, Associate Research Supervisor, Dept. of International Affairs (SATREPS Group) , JST</li><li>5) Evaluation and Analysis: Mr. Isao Dojun, Consultant, Chuo Kaihatsu Corporation</li></ol>
	(2) Colombian side
	<ol style="list-style-type: none"><li>1) Leader: Ms. Sara Maria Campos Infante, Coordinator, Group of Innovation and Technological Development, Ministry of Agriculture and Rural Development (MADR)</li><li>2) Member: Ms. Catalina Quintero, Coordinator for Bilateral Affairs, Colombian Presidential Agency of International Cooperation (APC Colombia)</li><li>3) Member: Ms. Alba Lucia Chavez, Research Associate, Agrobiodiversity Research Area, International Center for Tropical Agriculture (CIAT)</li></ol>

	4) Member: Mr. Ivan Camilo Avila Cortes, Assistant, Technical Sub-Management, National Federation of Rice Growers (FEDEARROZ-FNA)	
<b>Period of Evaluation</b>	From October 22, 2018 to November 11, 2018	Type of Evaluation: Terminal
<b>3. Results of Evaluation</b>		
<b>3-1. Project Performance</b>		
<p><b>Output 1:</b> The new breeding lines with higher water and nitrogen use efficiencies will be developed.</p> <p><b>Achievement:</b> It is anticipated that 3 lines each of Fedearroz 60/KP and CT21375/KP lines which have 5% higher yield potential under low input conditions (in total 6 lines) will be developed by the end of the Project (May 2019) . Considering a reliable perspective on achievement of the indicator of this output (more than 3 promising lines will be developed) and the situation on establishment of technologies related new breeding lines at the Colombian counterpart organizations, objective of the <b>Output 1 is achieved mostly</b> at the time of the terminal evaluation and will be achieved sufficiently by the end of the Project.</p> <p><b>Output 2:</b> The resource-efficient crop management and fertilization strategies will be developed at the farm scale.</p> <p><b>Achievement:</b> It was revealed that it is possible to reduce the amount of fertilizer by about 20% without affecting the yield by focusing reduction of initial nitrogen fertilization compared with the conventional fertilization method (180kgN/ha) . Farm management decision-making support system related to rational and low resources use will be developed by the end of the Project. Therefore, the objective of <b>Output 2 is achieved mostly</b> at the time of the terminal evaluation and is expected to be achieved sufficiently by the end of the Project.</p> <p><b>Output 3:</b> The water-efficient rice production system will be established at the watershed scale.</p> <p><b>Achievement:</b> Water management techniques that improve water use efficiency by 20% at field level are developed. For watershed level, it is necessary to accomplish development of the evaluation system on water saving effect at basin level and its operational manual. It is expected that objective of the <b>Output 3 is achieved mostly</b> at the time of the terminal evaluation and will be achieved by the end of the Project.</p> <p><b>Output 4:</b> The trial results from the precision agriculture experiments will be integrated and a practical system for technology transfer and capacity building will be established.</p> <p><b>Achievement:</b> Three (3) technical manuals (one technical manual on soil mapping as one of techniques for precision agriculture and two technical transfer manuals) will be prepared by the end of the Project. Technology transfer and farming management capacity of the project participated farmers in Tolima department were enhanced by the Project. Practical technology transfer system is not well developed yet. When the above manuals and a technology transfer system are developed well, it can be said that objective of <b>the Output 4 is achieved. Thus</b>, the objective of the Output 4 is achieved partially at the time of the terminal evaluation and will be achieved mostly by the end of the Project.</p> <p><b>Project Purpose:</b> Resource-efficient rice production techniques and their implementation methods suitable for Colombian environment are developed.</p> <p><b>Achievement:</b> At the time of the terminal evaluation, most of technologies (ca. 14 technologies in total) have</p>		

been under development or improvement. A technical guide for rice production will be prepared by organizing the listed technologies by the end of the Project. Preparation of related manuals on the listed technologies and usage of equipment is also progressing. When the ongoing research activities are progressed well, results of experiments are analyzed as scheduled, and finalization of the manuals is completed, it can be said that the objective of the Project Purpose is achieved. Thus, the objective of **the Project Purpose is achieved partially** at the time of the terminal evaluation and will be achieved mostly by the end of the Project.

### **3-2. Summary of Evaluation Results**

#### **(1) Relevance**

The relevance of the Project is considered to be high based on the facts described below.

1) Needs of increase of productivity of rice and development of resource-efficient rice production techniques in Colombia, 2) Relevance to the national policies of Colombia, 3) Conformity to the assistance policy of Japan to Colombia, 4) Appropriateness of the approaches taken by the Project (necessary outputs are setup for attaining the Project Purpose), 5) Appropriateness of selection of target area and target groups (technology development at the main irrigated rice cultivation area, and target groups (institutions) which have research capacity for new variety and technology development, and ability to practice technology dissemination), and 6) Comparative advantage of technical cooperation by Japan (long history and experience of rice cultivation and research experience in the developing countries in the world) .

#### **(2) Effectiveness**

The overall effectiveness of the Project is considered to be moderately high.

Development and/or improvement of most of technologies have been made or progressing. Preparation of manuals on developed technologies or usage of equipment is also progressing. When the ongoing research activities are progressed well, results of experiments are analyzed as scheduled, and finalization of the manuals are completed, the objective of the Project Purpose is achieved well by the end of the Project.

There are four components in this project, i.e. 1) development of new breeding lines with higher water and nitrogen use efficiencies, 2) development of resource-efficient crop management and fertilization strategies, 3) establishment of water-efficient rice production system, 4) establishment of integrated and practical system for technology transfer and capacity building. There are necessary components (outputs) for attaining the Project Purpose, therefore, logic of the Project is appropriate. Evaluation of effectiveness is assumed to be expected to be moderately high.

#### **(3) Efficiency**

The efficiency of the Project is considered to be moderately high from the viewpoints of 1) appropriateness of inputs provided by Japan (dispatches of experts and researchers, trainings in Japan, and provision of equipment were appropriate. There was a delay of procurement and delivery of some equipment in the early stage of the project period but it did not affect the Project Outputs.), 2) inputs provided by Colombian side (number of C/Ps and their continuity and financial contribution were appropriate), and 3) project management (periodical meetings and coordination of the project activities were appropriate), etc.

#### **(4) Impact**

It is expected that the Overall Goal will be achieved by the year 2024 (5 years after the completion of the Project) . Several impacts of the Project are observed. Therefore, it can be prospect that **the overall impact**

**of the Project will become high.** Specifically, it is as described below.

1) Prospect of achieving the Overall Goal “The resource-efficient rice production techniques developed in the project are disseminated to agricultural producers in Colombia and Latin American countries.” Through i) AMTEC Program of FEDEARROZ, and ii) dissemination of developed technologies by FLAR, it is expected that both two of indicators for the Overall Goal will be achieved within 5 years after the completion of the Project.

2) Other Impact Observed

i) Spread of MIRI (Multi Inlet Rice Irrigation) method to other rice farmers, ii) Increased interest to high value addition in rice, iii) Spinoff projects (4 projects derived from this Project were approved by other organizations.), iv) Impacts which will likely be realized in future (Shorter breeding period and transfer of promising lines to other Latin American countries)

3) None of negative impact was observed.

## **(5) Sustainability**

Sustainability of the Project is likely to be high based on the facts described below.

1) Policy aspect

Strengthening competitiveness of agriculture and livestock sector in rural areas, increase of production capability in rural communities, modernization of related infrastructures related with efficient use of soil and water are priority issues of the Government of Colombia. MADR, through the vice-minister office of rural development, works for formulating public policy related to public assets management such as soil and water resources management. The vice-minister office of agriculture and livestock affairs works, in accordance with Law 1876 of 2017, which creates National System on Agricultural and Livestock Innovation, provide conditions for appropriate development of extension service on agriculture and livestock. It is expected through these policies, technologies and generated knowledge of the Project will be promoted in order to increase technology adoption as well as to develop incentives for sustainable management of water resources. Considering that rice is regarded as an important crop for food security, it is expected that these policies guarantee the sustainability of the Project.

2) Institutional aspect

FEDEARROZ and CIAT have extensive experiences in new rice variety development, therefore, it is expected that several new varieties from promising lines will be registered about two (2) years after the completion of the Project. FEDEARROZ multiplies certified rice seeds of new varieties for sell to farmers. FEDEARROZ is also conducting dissemination of various rice technologies as AMTEC program. Therefore, developed technologies of the Project will be disseminated through AMTEC 2.0 program and seeds of new varieties will be distributed. Through the Agronomic Program of FLAR, developed technologies of the Project and promising lines will be disseminated to FLAR’s member countries in Latin America. Therefore, it is sure that the outcomes of the Project will be utilized in Colombia and Latin America.

3) Technical aspect

Counterpart researchers of CIAT and FEDEARROZ have enhanced capability to continue rice breeding

and other rice related research activities using acquired knowledge and skills. For applying some technologies of the Project into other rice regions, modification or adjustment of technologies will be required. Because of the technical trainings implemented by the Project, it is probable that they can do such improvement of technology. During the project period, personnel turnover was quite few. Therefore, transferred technologies under the Project will be established at their organizations. It is highly expected that technical sustainability of the Project is secured.

#### 4) Financial aspect

CIAT and FEDEARROZ have made significant financial contributions for implementing the Project activities. These organizations can continue breeding, rice research, and technology transfer activities with their own fund. FLAR has stable financial status by obtaining member fee and FLAR can disseminate developed technologies by the Project and new promising lines to member organizations in Latin America. Therefore, it is considered that the financial sustainability of the Project (in terms of availability of fund for effective use of outcomes of the project) will be secured well.

### **3-3. Factors that promoted realization of effects**

#### (1) Factors concerning to planning

None

#### (2) Factors concerning to the implementation process

##### 1) Effective progress of the joint research activities and technical transfer

Dispatch of Japanese researchers was increased in the second half of the project period in terms of number of persons and duration of stay in Colombia comparing to the dispatch in the first half of the project period. This arrangement made effective progress of the joint research activities and technical transfer at each sub-theme. Dispatch of a Japanese long-term expert is also effective for coordinating overall research activities and linkage among members of different sub-themes.

##### 2) Colombian leading farmers' participation into the project activities as counterpart

Four (4) leading farmers in Ibague have participated in the project activities directly as research counterpart. This is a unique effort of the Project. They visited Japan with other Colombian researchers for observing situation of agriculture in Japan, especially practices of precise agriculture. As a result, useful viewpoints such as direction of improvement of rice value chain in Colombia were obtained.

##### 3) Sharing information on the progress and results of activities of each sub-themes

Information sharing about progress of the project activities and problems facing has been done at the Joint Coordinating Committee Meetings and the Technical Coordinating Committee Meetings. In addition to these meetings, discussions on the progress and results of researches on 4 sub-themes, which were made deeply among researchers, were effective for integrating the results of sub-themes.

### **3-4. Factors that impeded realization of effects**

#### (1) Factors concerning to planning

None

## (2) Factors concerning to the implementation process

Initial stage of the Project, there was a delay in procurement and delivery of equipment but it did not affect Output as a Project whole.

### **3-5. Conclusion**

Since most of the indicators for Project Purpose and Outputs will be achieved or mostly achieved, the Project will be completed on May 2019 as it is planned. There are not a large issue in the evaluation of relevance, effectiveness and efficiency. Thanks to programs of AMTEC and FLAR, Impact and sustainability of this Project will be expected to be high.

The Project Purpose (development of a Technical Guide) is expected to be achieved by the end of the Project with effective progress of activities in the remaining project period. It is expected that the contents of the Technical Guide and technical manuals have suitable explanations considering target users and applicable conditions of each technology.

### **3-6. Recommendations**

3-6-1. Recommended Actions to be taken by the Project Team (Colombian researchers and Japanese researchers) in the Remaining Cooperation Period (up to May 2019)

- (1) Inclusion of explanations on applicable cultivation conditions and suitable farming size for technology adoption in the Technical Guide for Rice Production
- (2) Finalization of technical manuals and explanation about target users and contact address
- (3) Modification of the manuals of the Output 4 incorporating human resource development aspects and case study in Colombia
- (4) Discussions on how to incorporate the developed technologies into AMTEC 2.0 program
- (5) Discussion on format for the AMTEC 2.0 questionnaire survey on adoption of technologies developed by the Project
- (6) Completion of necessary procedures for donation of equipment and clarification of owner of equipment after the completion of the Project
- (7) Implementation of the seminar (s) for the decision making support system (Output 2) in order to apply other rice cultivation areas other than the central area
- (8) Clarification of the objective of use and characteristics of the water-distribution model for water-shed scale (Output 3) and preparation of a manual on the model
- (9) Naming of new varieties which can imagine that the variety is derived from this SATREPS projects
- (10) Determination of the first indicator of the Overall Goal from “The resource-efficient rice production techniques developed in the project adopted to X% of the Colombian agricultural producers” to “The resource-efficient rice production techniques developed in the Project adopted to 30% of the rice producers in Tolima department.”

3-6-2. Recommended Actions to be taken in the medium to long term by the Institutions Concerned in Colombia

- (1) Fedearroz’s service provision to farmers using soil mapping and yield sensor technologies
- (2) Fedearroz should report on the progress in breeding activity including variety registration to JICA Colombia Office.
- (3) Government of Colombia and other relevant institutions should discuss on probability of introduction of incentive on lower irrigation water use.

### **3-7. Lessons Learned**

- (1) In order to ensure the social application of the results of SATREPS Project, it is important to identify which institution is a key service provider for agricultural extension in target countries and make it deeply involved from the technological development stage.
- (2) In agricultural project, social implementation of the developed technologies can be accelerated when leading farmers participate to the Project as research members.
- (3) In bilateral technical cooperation like SATREPS, the involvement of international research institutions contributes considerably to the production of valuable research results and the external dissemination of the project outputs.
- (4) Dispatching monitoring missions from JICA and JST at an appropriate timing is important for implementation of the SATPRES Project in an organized way.