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FINAL

PROJECT ASSISTANCE COMPLETION REPORT

TISSUE CULTURE FOR VIRUS-FREE POTATO PROPAGATION PROJECT

PROJECT NO. 936-5542 (G)

OBLIGATION NO. 3621474

United States Agency for International Development
Jakarta, Indonesia
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PROJECT ASSISTANCE COMPLETION REPORT
TISSUE CULTURE FOR VIRUS-FREE POTATO PROPAGATION PROJECT

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AID/W: TISSUE CULTURE FOR VIRUS FREE POTATO PROPAGATION PROJECT (936-5542)
PROJECT ASSISTANCE COMPLETION REPORT

INTRODUCTION.

This Project Assistance Completion Report of the Tissue Culture For Virus-Free Potato Propagation Project is written in accordance with section B.4 of HB No.3 Appendix 14A. Chapter I of this report describes the project overview which further details the background, project purpose, project input and project administration; Chapter II illustrates the current project status; Chapter III deals with project accomplishments consisting of the provision of inputs, achievement of outputs, and attainment of project purpose. Lessons learned from the project can be seen in Chapter IV. Chapter V discusses the post-project AID monitoring responsibilities.

This report utilizes a number of reports and documents produced under the project such as quarterly and final progress report by the implementing agency, the Lembang Horticulture Research Institute; consultant's reports and USAID's project documents. A list of these publications is presented in Attachment I

I. PROJECT OVERVIEW.

BACKGROUND.

In Indonesia, since Pelita I, potatoes have been given the highest priority in vegetable production programs due to increasing consumption demand, high nutritive value, and in order to enhance the agricultural production diversification programs of the GOI.

In the early 1980's the total harvested area was approximately

27,000 hectares, mainly in highland areas, of which 75% was located in Java and the other 25% is located in Sumatera and Eastern Islands of Indonesia.

The average potato production of 10 metric tons/hectare was considered low compared to potential production of 20 to 30 tons/hectare following research recommendations.

This low production was, among other things, a result of the use of poor quality seed. In addition, potato production has been limited almost exclusively to traditional European or Australian cultivars due to the inability to locally produce sufficient amounts of suitable planting materials. Furthermore, imported seed degenerates after three to four generations which also contributes to low production.

Approximately 30,000 tons of clean seed was needed yearly for the 27,000 hectares of potato field throughout Indonesia. One method to meet the need for suitable seed material was to develop a program of cultivar improvement coupled with a workable rapid multiplication program using tissue culture techniques.

To further develop this technique, the Government of Indonesia and the USAID entered into a four-year Limited Scope Grant Project Agreement to implement the Tissue Culture for Virus-Free Potato Propagation Project in August, 1982.

PROJECT PURPOSE. As contemplated in the original "Limited Scope Grant Project Agreement", the purpose of the project was to develop the capability to produce and maintain virus-free nuclear stocks of widely grown commercial cultivars of potato, via meristem culture, and enhance the effectiveness of the Lembang Horticulture Research Institute in receiving introduced genetic materials from abroad. Virus-free nuclear stocks of potato were to be utilized in the production of virus-free foundation seed and, ultimately,

healthy certified seed for distribution to farmers as an integral part of the national potato production program.

PROJECT INPUT. The total project inputs of $360,340 consisted of $152,640 grant from AID and counterpart budget of $207,700 from the Goverment of Indonesia, included funding for technical assistance, commodities, training, travel, and contingencies.

PROJECT ADMINISTRATION. The project was implemented by the Agency for Agricultural Research and Development (AARD), within the Minsitry of Agriculture, with overall responsibility for general guidance and implementation vested in the Director of the Central Research Institute for Food Crops. Day to day implementation was under the general guidance of the Director, National Vegetable Research Program, AARD, in collaboration with the Director, Lembang Horticulture Research Institute (LEHRI) and under the coordination by the USAID Backstop Project Officer of the Office of Agriculture.

II. CURRENT PROJECT STATUS.

The Limited Scope Grant Project Agreement for this four-year project was signed on August 27, 1982. The original agreement was amended twice - on November 18, 1982, and on May 7, 1986. The first amendment authorized the project to finance both the foreign exchange costs and the local currency costs for technical assistance, commodities, training and travel, whereas the second amendment revised the budget components without additional funds by shifting the budget allocations among budget line items.

The project assistance completion date (PACD) was extended from December 31, 1986 to June 30, 1987 enabling LEHRI to complete the planned project objectives which were, at that time, behind schedule due to the delays in the procurement of major laboratory equipment and chemicals from the U.S. and in constructing a 200m^2 screen house at LEHRI.

Despite the implementation delays above, the project results have been impressive. Laboratory and field work, and transfer of technology have been achieved. Examples of these gains are:

a) LEHRI has a large collection of seed material from in-country and abroad.

b) LEHRI obtained TA from the regional office of the Center for International Potato in the Philippines, and SAPPRAD (South East Asia and Pacific Potato Research and Development).

c) LEHRI conducted local training on tissue culture techniques for 105 farmers, extension workers, and researchers from selected provinces.

d) Three LEHRI staff members attended a one-week conference of the international plant biotechnology netwrok at Colorado State University.

e) One of LEHRI's staff attended a one-week conference on plant biotechnology in Bangkok, Thailand.

f) One of LEHRI's staff, two extension specialists and two key farmers conducted a one-week comparative field trip to the Philippines to gain additional knowledge regarding tissue culture and rapid multiplication technologies.

g) LEHRI obtained short term TA from the USDA Agriculture Research Service to provide technical support for the project and to formulate a plan for the project continuation and expansion. The result of this TA was that LEHRI received a $150,000 grant under the Program In Science And Technology Cooperation (PSTC) for the Biological Control of Cucumber Mosaic Virus Project.

h) One of LEHRI'staff attended a three-month training course in molecular plant virology at the American Type Culture Collection (ATCC), Washington, D.C.

i) Two of LEHRI's staff attended a ten-day seminar on "South East Asia and Pacific Potato Seed Production" at Baguio City, Philippines.

III. PROJECT ACCOMPLISHMENTS.

PROVISION OF INPUTS: Project Inputs comprised the following: 1) technical assistance, 2) commodities, 3) training, 4) travel, and 5) contingencies.

A total of 2.5 person-months (pm) of technical assistance was obtained from the Regional Office of the Center for International Potato (CIP), South East Asia Program for Potato Research and Development (SAPPRAD), and the USDA as shown in table 1:

Table 1. Technical Assistance

Institution	TA Team	Expertise	Total P.M.	Date of Service
CIP/SAPPRAD	-Dr.P.Van der Zaag	Agronomist	1	Nov.4-Dec.4,84
	-Mrs. A. Graza	Agronomist	1	ditto
USDA	Dr. J.M. Kaper	Chemist	.50	Jan.8-22, 84
			2.5 pm	

The TA team from CIP/SAPPRAD was involved in helping LEHRI receive introduced genetic materials from abroad, transferring

technology and conducting local training in rapid potato seed multiplication using tissue culture techniques.

The TA from USDA provided assistance to LEHRI in laboratory works and developed a plan for project continuation and expansion. Achievement of this was provision a $150,000 grant to LEHRI under the PSTC program for the implementation of a 4 year project entitled "Biological Control of Cucumber Mosaic Virus".

A 200m^2 aphid-proof screen house was constructed at LEHRI facilities for maintaining and multiplicating clean plant materials through rapid multiplication technique (stem cutting). In addition, one simple propagation house and three simple screen houses were also constructed for tuberlet propagation.

Four simple screen houses were constructed on two key farmers fields at Wonosobo, Central Java and Malang, East Java for tuberlets propagation as the follow-up of local training. A tissue culture laboratory was also set up at LEHRI facilities for incubation room and preparation room.

Laboratory equipment and chemicals were purchased locally as well as from the U.S.A. Table 2 shows the type of equipment purchased and current condition.

Table 2. Purchased Commodities - Types of equipment and current condition

No.	Description	Qty	Condition	Marked with AID Emblem
1	Autoclave	1	good	yes
2	Generator	1	good	yes
3	Vacuum cleaner-Electrolux	1	good	yes
4	Refrigerator-Frigidaire	1	good	yes
5	Laminar Air Flow	1	good	yes
6	Elia Reader	1	good	yes
7	Stereo Master-Microscopes	3	good	yes
8	Isotemp Lab - oven	1	good	yes
9	PH Meter	2	good	yes
10	Heater & Magnetic Stirrer	2	good	yes
11	Homogenizer	1	good	yes
12	Shaker	1	good	yes
13	Heating and Drying oven	1	good	yes
14	Camera	1	good	yes
15	Electric typewriter	1	good	yes

As table 2 suggests, this equipment is still in good condition, thus, still useable. Small laboratory items such as petri dishes, pipetes, syringes, and chemicals, were not listed in the Table 2, because they are consumable stuffs. However, some of this equipment and chemicals are still being used by LEHRI for continued tissue culture activities.

Local training in rapid multiplication techniques involving 105 key farmers, extension workers and researchers was conducted by LEHRI at various places as indicated in Table 3.

Table 3. Local Training in Rapid Multiplication Using Tissue Culture Techniques

Period of Training	Place	# of Participants	Remarks
Nov.4-Dec.4, 1984	LEHRI, Lembang, W.Java	37	key farmers, extension workers and researchers.
Mar.12-15, 1985	Extension Service, Batu, East Java	12	10 key farmers + 2 extension workers
May 27 - June 10, 1985	Agricultural Education & Training Center, Ketindan, E.Java	30	extension workers and seed farmers
Oct.27 - Nov. 8, 1986	LEHRI, Lembang, W.Java	26	Researchers
		105	

As shown in Table 3, LEHRI was committed to transferring technology in order to enchance the distribution of agricultural research results to farmers. LEHRI kept monitoring the training participants and provided follow-up technical assistance and materials such as tuberlets and simple screen houses to the farmers for seed multiplication.

Overseas training, seminar and comparative field trip, is shown in Table 4.

In addition, a one-day presentation regarding project activities was conducted by the principle investigator and the TA team in the USAID conference room on December 11, 1984.

Table 4. List of Overseas Training, Seminars, and Comparative Field trip

Date and Place of Seminar	Title	No. of LEHRI Participant
Oct.21 - 25, 1985 Colorado State Univ.	First Annual Conference of Plant Biology	1
Jan.11 - 16, 1987 Bangkok, Thailand	Second Annual Conference of Plant Biology	1
July 1 - 10, 1985 International Potato Center, Baguio City, the Philippines	Training in rapid multiplication	2
Feb.22 - Mar.1, 1987 The Philippines	Comparative field trip	4

During the life of the project, the Government of Indonesia provided both cash and in-kind contributions, particularly for salaries, supplies, local training, local travel and contingency.

Table 5 illustrates the AID planned and actual budgets expenditures.

Table 5. Planned vs. Actual Budget Expenditures ($)

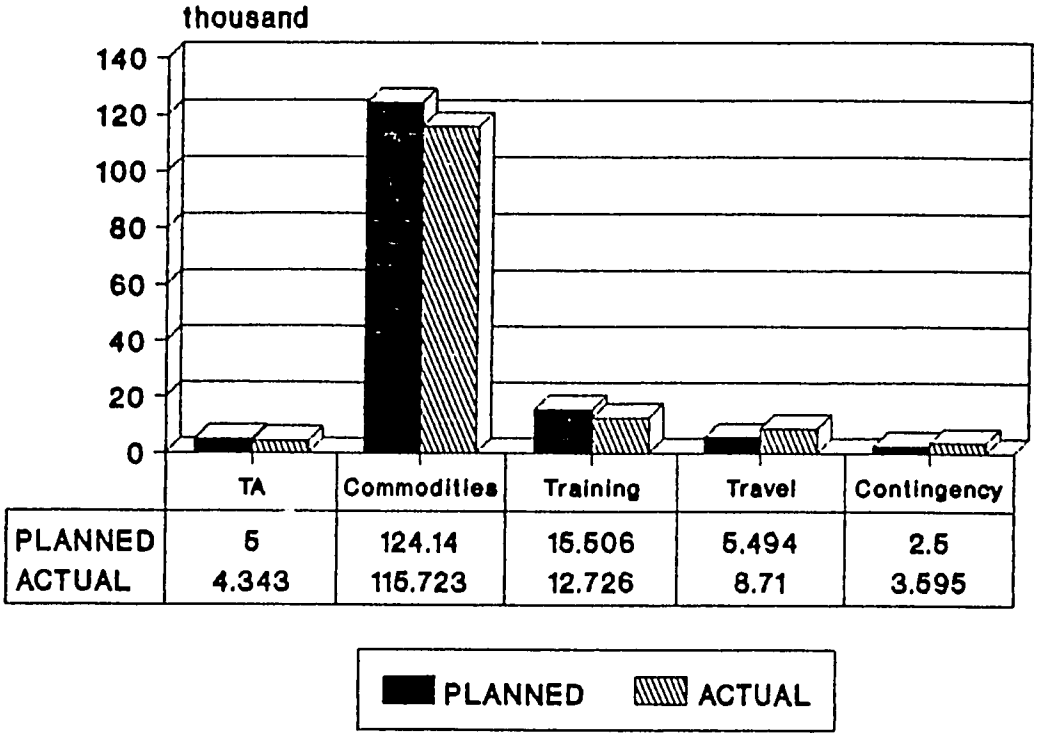
Project Elements	Planned	Actual	%
1. Technical Assistance	5,000	4,343	87
2. Commodities	124,140	115,723	93
3. Training	15,506	12,726	82
4. Travel	5,494	8,710	159
5. Contingency	2,500	3,595	144
Total	152,640	145,097	95

Table 5 indicates that total AID actual expenditure was US$ 145,097 or 95% of the planned budget. The GOI contribution provided was Rp. 205,534,296[1]). The U.S. dollar amounts equivalent to these Rupiah amounts were not reported due to Rupiah devaluations during the life of the project. When the project started in November 1982, the exchange rate was US$1 = Rp. 683, and at the time the project was completed (in June 30, 1987) the exchange rate was $1 = Rp. 1,651.

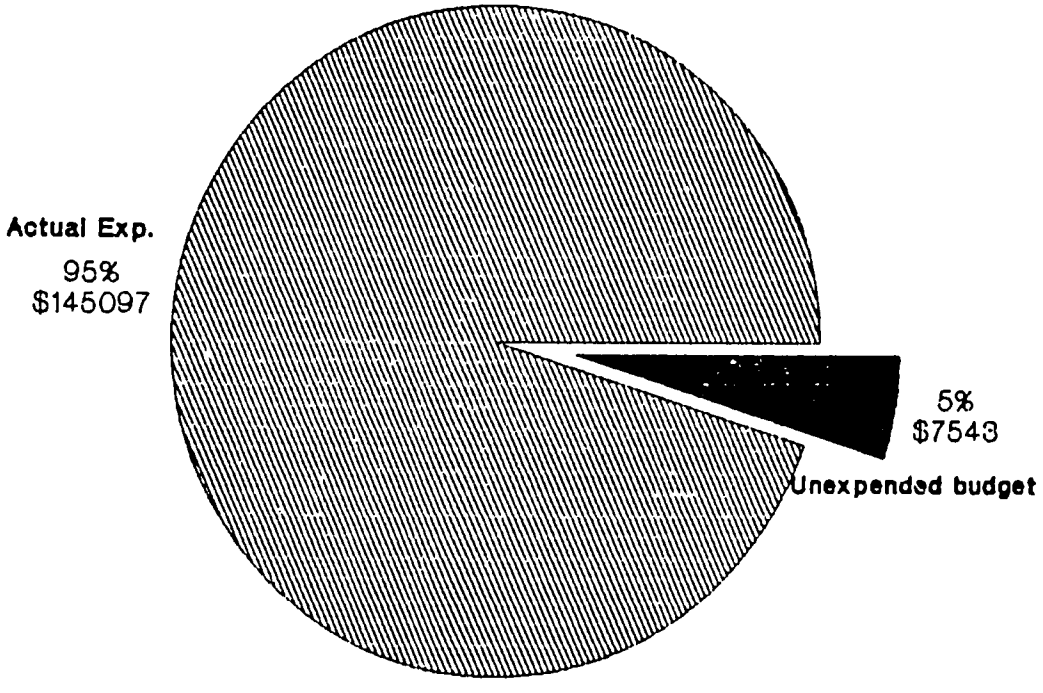
[1]) Source: LEHRI's quarterly financial reports.

AID PLANNED Vs. ACTUAL BUDGET EXPENDITURE

Tissue Culture for Virus Free Potato Proposation Project



	TA	Commodities	Training	Travel	Contingency
PLANNED	5	124.14	15.506	5.494	2.5
ACTUAL	4.343	115.723	12.726	8.71	3.595



ACHIEVEMENT OF OUTPUTS. The Limited Scope Grant Project Agreement contained three major project outputs: 1) Virus-free nuclear stocks of widely grown commercial cultivars of potato via tissue culture produced and maintained; 2) enhanced effectiveness of the Lembang Horticulture Research Institute (LEHRI) in receiving introduced genetic material from abroad; and 3) healthy certified seed distributed to farmers as an integral part of the national potato production program.

Achievement of these outputs has been accomplished. Laboratory and field work, and the transfer of technology have been achieved; training in tissue culture technology as well as seminars for LEHRI staff and farmers have been conducted; collaboration with national and international institutions has been established; improved potato cultivars have been produced and maintained; and germ plasm collection has been developed.

In addition to the accomplishments described earlier and shown in tables 1, 2, 3 and 4, additional accomplishments are:

a) The following potato cultivars produced and maintained: 1) Cipanas,
   2) Rapan 106, 3) Cosima, 4) Segunung, 5) Berolina, 6) Monza, 7) Desiree, 8) Katella, 9) DTO-33, 10) Thung 151.

b) Germ plasm of the following potato cultivars developed: 1) DTO-28,
   2) LT-1, 3) LT-7, 4) I.931, 5) BR.63.5, 6) 7 XY-1, 8) 800.941, 9) N.565.1, 10) 397-13, 11) 277.2.

c) Virus free plantlets along with simple screen houses distributed to key farmers at Wonosobo, Central Java and Malang, East Java for rapid seed multiplication.

ATTAINMENT OF PROJECT PURPOSE. There was no project evaluation during the life of the project, given the size of the project and because an interim evaluation was not required under this AID/W funded project. It can be seen, however, that the GOI has demonstrated a constant commitment to the project and its purpose. Some examples are:

1) LEHRI established collaboration with other institutions such as Bank Indonesia and Agricultural Extension Services in the efforts of potato seed distribution and production at farm level.

2) Although the project ended on June 30, 1987, LEHRI is still conducting research activities in this area using their development budget and continues to monitor the potato seed production activities at the farm level and provides the farmers with seed materials and technical assistance.

3) As a project follow up activity, LEHRI is planning to conduct local training in "Pathogen-free Seed Potato Production" for farmers, extension workers, researchers, and the private sector. The training proposal has been sent to USAID for funding consideration under the GPT II project.

4) As a result of the Technical Assistance from the USDA and follow-up training of one LEHRI staff at USDA, LEHRI was granted a $150,000 grant under the Program in Science and Technology Cooperation (PSTC) to implement the Biological Control of Cucumber Mosaic Virus Project.

From the above it is felt that the project had a positive impact on beneficiaries, especially in the transfer of technology. The institutional capacity within LEHRI has improved as a result of, among other things, the collaborative work with other national as well as international research institutions. Sustainability of

research activities has been proven by the fact that LEHRI is still conducting related activities and is even extending these activities at the farm level using their budget.

Although there was no in-depth study on the impact of the project toward farmers income, some notes of periodic visits made by the AID backstop project officer to project sites indicated that the key farmers who participated in the potato seed production program imposed by the project positively benefited from the project. The farmers declared that their income had significantly increased since they made investments in the program.

IV. LESSONS LEARNED FROM THE PROJECT.

Apart from the impressive accomplishments made during the life of the project of the Tissue Culture for Virus-Free Potato Propagation Project, a number of lessons have been learned from the project implementation as summarized below:

1. An interim evaluation which measures accomplishment of project activities v.s. planned objective should be budgeted in future AID/W funded projects.

2. Research projects in bio-technology area similar to this project should be given greater emphasis in future AID-funded research programs. Fortunately, following this project, some GOI entities were awarded grants from AID/SCI under the Program in Science and Technology Cooperation, in the area of bio-technology.

3. Greater attention should be given to an effective way of diseminating research results to farmers. One of the efforts is through publication readable to farmers in local language.

4. AID/W technical backstop officer should visit project sites more frequently.

5. A well designed post-project study on the impact of AID/W funded projects to beneficiaries may be necessary.

6. Information exchange in this area among national research institutes, universities and the private sectors would be useful to avoid duplication in biotechnology.

V. POST-PROJECT AID MONITORING RESPONSIBILITIES.

As mentioned earlier, besides implementing the Tissue Culture For Virus-Free Potato Propagation Project, LEHRI has also been conducting the Biological Control of Cucumber Mosaic Virus Project funded under the PSTC program of AID/SCI.

Accordingly, when the AID backstop project officer conducts periodic site visits for the latter project, AID will be able, at the same time, to monitor the post-project activities of the Tissue Culture For Virus-Free Potato Propagation Project that are still being carried out by LEHRI.

The local training activities in "Pathogen-free Seed Potato Production", when approved and funded under the GPT II Project, will be monitored by AID.

Clearance :	Initial	Date
APD:R.Navin	(in draft)	10/02/89
J.Lindborg	(in draft)	10/09/89
G.Like	(in draft)	12/12/89
ARD:M.Winter	(in draft)	12/13/89
PPS:J.Hradsky	(in draft)	01/02/90
FIN:J. Hepp	JH	4/3/90
DD:L.Twentyman	[illegible]	4/4/90

Drafted:APD:JVerhelst:rh:12/08/89:7707a

ATTACHMENT I

PUBLICATIONS:

BALAI PENELITIAN HORTIKULTURA LEMBANG - USAID, Kumpulan Makalah Latihan Teknik Pembibitan Kentang, 26 Nopember - 4 Desember 1984 (series of papers for the training in Potato Seed Multiplication Technique).

GRAZA, I and VANDER ZAAG, P., Rapid Multiplication of Potato (Solanum Tuberosum) , Research Assistant and Agronomist, International Potato Center, Region VII, Box 933, Manila, Philippines.

HIDAYAT, Iteu, Tissue Culture For Virus Free Potato Production, Paper presented in the Seminar at USAID, December 11, 1984, Research - Worker Lembang Horticulture Research Institute.

LEMBANG HORTICULTURE RESEARCH INSTITUTE, Tissue Culture For Virus-Free Potato Propagation Project, Final Report of Cooperation Project, Indonesia-USAID (AID/W-936-5542), Bandung, Indonesia, 1988.