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UNCLASSIFIED
CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) – PART I

Report Symbol U-447

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
N-FIXATION - SYMBIOTIC, Tropical Legumes	931-0613	DS/AGR/RNR

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 81-18

☐ REGULAR EVALUATION ☒ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING		7. PERIOD COVERED BY EVALUATION	
A. First PRO AG or Equivalent	B. Final Obligation Expected	C. Final Input Delivery	A. Total	$ 6,750,000	From (month/yr.)	2/77
FY 75	FY 85	FY 86	B. U.S.	$ 6,750,000	To (month/yr.)	7/80
					Date of Evaluation Review	7/7-10/80

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Continue project as planned to June, 1981	Halliday, Univ. Hawaii, Frederick, DS/AGR/RNR	6/81
2. Prepare proposal for 5 year extension of project	Halliday, Univ. of Hawaii	9/80
3. Present proposal for consideration by AID/W	Frederick, DS/AGR/RNR	11/80
4. If approved, complete agreement for extension	Frederick, DS/AGR/RNR	6/81

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☒ Project Paper
- ☒ Financial Plan
- ☒ Logical Framework
- ☐ Project Agreement
- ☐ Implementation Plan e.g., CPI Network
- ☒ PIO/T
- ☐ PIO/C
- ☐ PIO/P
- ☐ Other (Specify) _____
- ☐ Other (Specify) _____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☐ Continue Project Without Change
- B. ☐ Change Project Design and/or
- ☒ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

DS/AGR/RNR: LFrederick — Date: 10 Feb 1981
DS/AGR/RNR: CSimkins — Date: 16 Feb 1981
DS/AGR: MMozynski — Date: 13 Feb. 1981
DS/AGR: JWalker — Date: 17 Feb. 1981
DS/AGR: DFiester — Date:
DS/PO: ASilver — Date: 3/6/81

12. Mission/AID/W Office Director Approval

Signature

Typed Name: E. J. Babb, DS/DAA/FN

Date: 3/10/81

AID 1330-15 (3-78)

13. SUMMARY

Initiated in 1975, this project is designed to provide a foundation of tested rhizobial germplasm for tropical legumes, to establish international field trials of legume inoculants through cooperation with a network of national scientists, improved inoculation methodology, to establish international field trials of legumes inoculants through cooperation with a network of national scientists, and a better understanding of the management of legumes for optimum nitrogen contribution to cropping systems and trained technicians in developing countries.

The NifTAL project has accomplished the follpwing:

1) Assembled a team of 6 microbiologists and 5 agronomists with 14 support staff and 5 graduate students.

2) Developed appropriate and adequate research and training facilities from idle county school buildings.

3) Assembled a comprehensive collection of Rhizobium species amounting to about 1500 strains. Effective strains are available for about 80 different legume species. Upon request, distributed strains to scientists in developing and other countries.

4) Screened Rhizobium strains for specificity and effectiveness on tropical agricultural legumes and tolerance to acid soils.

5) Development of improved inoculant production techniques using low capital, small-scale systems.

6) Conducted research on effects of soil acidity, phosphorus deficiency, shading and intercropping on nitrogen fixation by tropical legumes.

7) Provided 6 weeks short course training in Rhizobium technology to non-administrator scientists from developing countries - in Hawaii (24 students), in Kenya, (17 students), in Malaysia (13 students) and in Brazil (50 students). Provided intern training at Hawaii for 13 LDC scientists.

8) Built international linkages by hosting workshop and publishing proceedings on "Exploiting the Legume-Rhizobium Symbiosis in Tropical Agriculture," and "Planning an International Network of Legume Inoculation Trials." Participated in international conferences and symposia, and visit scientists in developing countries.

9) Initiated the field testing of legume inoculants to determine the amount of crop yield increase by standard trials made cooperatively with national scientists in their own countries, and assumed the responsibility of coordinating the results. Some potential cooperators have asked for greater financial support than the project can support. Trials initiated at more than 80 locations in about 30 countries.

10) Information dissemination includes publication of a quarterly newsletter "Biological Nitrogen Fixation Bulletin", sent to AID Missions, national scientists and administrators, a bibliography on biological nitrogen fixation and a newsletter, "Notes from NifTAL" sent occasionally to former trainees.

In spite of relatively primitive facilities, a feeling of isolation and lack of contact with the main University Campus, the staff has proceeded satisfactorily according to project design. The research publications are fewer than expected, but the network and international trials are in more countries than expected. The review team strongly recommended that the project be continued and provided some guidance for an extension (See report attached). The evaluation was conducted to measure progress, to assess program direction and to make suggestions regarding the continuation of the project by an extension.

14. EVALUATION METHODOLOGY

The evaluation team had the following five members:

1) Dr. H. Popenoe (soil scientist), Director International Programs, University of Florida, Gainesville;

2) Mr. A. Hankins (agri specialist), ASIA/TR/ARD;

3) Dr. C. C. Black (biochemist), Dept. of Biochemistry, University of Georgia, Athens;

4) Mr. D. Schaer (agri specialist), AFR/DR/ARD;

5) Dr. Miller (soil microbiologist), USDA/SEA/CR and Dept. of Agronomy, Ohio State University, Columbus, Ohio.

The review was conducted on site (1 day) at the University of California at Davis, at the project site on Maui (2 days) and at the University of Hawaii campus (1 day) at Manoa, Honolulu. Reports were made with questions and discussion, and laboratory, greenhouse and field facilities visited. No locations in other countries were visited. Cost of evaluation included travel and per diem for all members of the team and the Project Officer (L. Frederick, DS/AGR/RNR) except Mr. Schaer who was in Hawaii on home leave and Dr. Miller who was supported by USDA. Dr. Popenoe and Dr. Black were also entitled to consulting fees due to their membership, respectively, on the Joint Research Committee of BIFAD and the Research Advisory Committee of AID. Total costs to AID for the team are estimated to be $5,000. Total costs for the evaluation would also include costs for Schaer and Miller, and the cost in time and materials for the staff members at the University of California at Davis and the University of Hawaii-conservatively estimated to be at least equal to the team costs.

Discussions about the project were held with the following personnel:

University of California at Davis:
Dr. D. N. Munns, soil scientist-subcontractor leader
Avilo Franco, soil microbiology-grad student (Brazil)
Cleverson Sequeira, grad student (Brazil)
Ben Oruko, grad student (Kenya)

David Lauter-grad student (USA)
Doug Beck-grad student (USA)
Tom Davis-grad student (USA)

University of Hawaii:
Dr. Ned Kefford, Acting Dean, College of Agriculture
Dr. Kim Bridges, Acting Director, International Program, College of Agriculture
Dr. Peter Rotar, Chairman, Department of Agronomy
Dr. Jake Halliday, NifTAL Project Leader
Dr. A. S. Whitney, Department of Agronomy, NifTAL Agronomist
Dr. Ben Bohlool, Department of Microbiology, NifTAL Advisor
Dr. Robert Davis, NifTAL Training Leader
Dr. P. Somasegaran, NifTAL Microbiologist
Dr. J. C. Burton, NifTAL Inoculant Production Specialist
Dr. K. Stockinger, NifTAL Agronomist
Dr. D. McNeil, NifTAL Plant Physiologist
Dr. M. Habte, Department of Agronomy, NifTAL Soil Microbiologist
Mr. B. Kerrey, NifTAL, Associate Director
Mr. H. Hoben, NifTAL Training Coordinator
Ms. S. Harris, NifTAL Information Specialist
and support staff and graduate students

15. EXTERNAL FACTORS

Project activities have shifted focus from Hawaii to international cooperative activities-note especially (1) training courses offered in Kenya, Brazil, Malaysia and planned courses for Mexico and (2) international legume inoculation trials (INLIT)-see page 10 and 8 respectively in team evaluation report.

16. INPUTS

Due to the double-digit inflation rate and the very large increases in air fares, the activities of the project are limited to a smaller effort than originally planned. Some relief was obtained by the aggressive action of the NifTAL staff in obtaining cooperation and small amounts of funds from other sources-see Table 1 of team evaluation report.

17. OUTPUTS

Outputs of training, the International Network of Legumes Inoculation Trials (INLIT) are on target, but the research activities have required priorization due to budgetary constraints resulting from unexpected inflation costs. Greater emphasis and achievement have been made with the Rhizobium collection and evaluation, with improved inoculant production technology and in the field testing of legume inoculants, but with lesser activity on inoculum delivery techniques and development of cultural systems to exploit more fully the nitrogen contribution of legumes in tropical cropping systems. Outputs are given briefly in item 13-summary and the team evaluation on pages 5 through 10.

MAGNITUDE OF OUTPUTS

	Projected in log frame (to 6/81)		Achieved by 7/80
1)	Rhizobium Collection — Active	300	250
	Rhizobium Collection — Reserve	600	650
	Rhizobium Collection — Presumptive	-	600
	Distributed to Workers	100	400
2)	Superior strains 2 per Major Legume		3 for 13 Major Legumes; all identified serologically
	Field Testing Program	40 Cooperators	30 Cooperators
3)	Evaluation of -		
	Inoculum Carriers	10	5
	Packaging Materials	4	2
	Beneficial Fungi	2	0
	Stress Inoculation	1	3
4)	Techniques for increasing N-fixation of intercropped Legumes	1	1
5)	Trained Technicians	30	27
6)	Graduate Students	4	5

18. PURPOSE

Project purpose as given in the log frame of project is as follows:

1) Assemble comprehensive Rhizobium collection, select and characterize superior strains effective on economic tropical legumes and distribute to researchers and inoculum producers;

2) Develop systems for improved inoculum delivery and for ensuring dependable effective nodulation in the field;

3) Develop improved techniques and cultural systems to more fully exploit N contribution of legumes to cropping systems;

4) Train technicians in Rhizobium bacteriology and cultural techniques for maximizing fixation.

Progress on these purposes is satisfactory to excellent especially considering the management problems posed by increased costs due to inflation. See pages 5 through 12 for team evaluation of these items.

19. GOAL/SUBGOAL

The goal is to increase quantity and improve quality of food produced by small and large farmers in tropical LDCs with the subgoal to reduce dependence of LDC farmers on N-fertilizers through greater exploitation of nitrogen fixation by tropical legumes. Progress toward subgoal is satisfactory with special note of contributions to the inoculant production and distribution in Thailand and the initiation of technical assistance to Zambia and Egypt for improved inoculant production. The technicians that have been trained under the project have demonstrated increased yields of certain legumes by proper inoculation with selected strains of Rhizobium.

20. BENEFICIARIES

As indicated in Item 19, several countries are using legume inoculants more widely and some are developing inoculant production capabilities. As the national scientists demonstrate the benefits of BNF technology by farmers, programs in-country will be developed to increase the use of BNF technology by farmers. Inoculant production and distribution can provide opportunities for employment in this enterprise.

21. UNPLANNED EFFECTS

None at this time.

22. LESSONS LEARNED

The demand for technical assistance has led to the development of the concept of regional BNF Resources Centers to make travel more efficient and to meet requests more quickly.

The implementation of a major project by the University has led to some difficult problems. Some suggestions for improving the relationships between the project and the University are given on pages 2 to 5 of the Team Evaluation Report

23. SPECIAL COMMENTS OR REMARKS

In view of inflated costs and demand for increased technical assistance, the funds needed each year to support the NifTAL project undertaken by the University of Hawaii will be 50 to 100% greater than the current support. If such financial support is not provided, the use of nitrogen fertilizers with the attendant costs are likely to increase, if money can be obtained by LDCs. If money is not available, the yields of their crops will not improve or may decrease, leading to increased imports of food. In East Africa, several countries have already shifted from being exporters of grain legumes, such as beans, to being importers.

Attached is the Report of the Review Team on the Nitrogen-Fixation, Symbiotic project 931-0613 implemented by the University of Hawaii contract AID/ta-C-1207, comprised of 12 pages, 1 table and Appendices A through D.