

PO-ABC-777 XPA #2 931043 (6)  
463

STATE - A.I.D. - USIA ROUTING SLIP				DATE 2/18/76		
TO:	Name or Title	Urgen. Symbol	Room No.	Bldg.	Initials	Date
1.	Dr. Edgar Rice	TA/AGP	Rm. 2239MS			
2.	<i>Anna</i>					
3.	<i>This goes in Wood Central</i>					
4.	<i>Research with Oregon State</i>					
5.						
Approval		For Your Information		Note and Return		
As Requested		Initial for Clearance		Per Conversation		
Comment		Investigate		Prepare Reply		
File		Justify		See Me		
For Correction		Necessary Action		Signature		
REMARKS OR ADDITIONAL ROUTING						
<p>Dr. Rice,</p> <p>Per our telcon of 2/18/76, here is a copy of Stanley Miller's letter which we discussed.</p> <p>If you agree to keep the current contract open thru September 30, 1976 for the Brazil and San Salvador effort ONLY, then your PIO/T which instructs the amendment of that contract must make it clear that all other effort under the current contract terminates as of 31 March 1976.</p> <p>Your second PIO/T should then instruct us to issue a new contract which commences on April 1st for the all new and different effort which will be conducted under that contract.</p> <p>If you have questions, please don't hesitate to call me.</p> <p>Thanks,</p>						
FROM: (Name and Org. Symbol)			ROOM NO. & BLDG.		PHONE NO.	
Va. Perelli			745PF		235-1289	

International Plant Protection Center  
Oregon State University  
Corvallis, Oregon 97331 USA

February 12, 1976

Mrs. V. C. Perelli  
Contracting Officer  
Technical Assistance Branch  
Central Operations Division  
Office of Contract Management  
Agency for International Development  
Washington, D.C. 20523

Dear Mrs. Perelli:

Authorization is hereby requested to extend our present contract, no. AID/CM/ta-C-73-23, for six months, from April 1 through September 30, 1976. The request is made because the periods of the work plan and of the contract do not coincide.

Two O.S.U. staff members and their families will remain in Brazil and El Salvador until the end of the respective growing season in order to complete the contracted research. Mr. Herbert Fisher will remain in Recife, Brazil through June and Mr. Richard Chase will remain in San Salvador, El Salvador, through August. Their salaries through these months, allowances, and other expenses at their overseas locations are included in the following suggested budget extension.

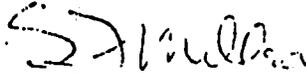
Sufficient money was budgeted in the present contract to cover the salaries and other expenses of these men and to pay costs of transporting them, their families, and their household and personal goods back to the United States for the period of the work plan as required by the Contracting Officer.

Mrs. V. C. Perelli  
February 12, 1976  
Page 2

SUGGESTED BUDGET TO COVER EXTENSION FROM APRIL 1, 1976  
THROUGH SEPTEMBER 30, 1976 FOR EXPENSES OF FISHER AND CHASE,  
NOW OVERSEAS

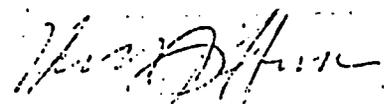
Salaries	12,491
Fringe Benefits	1,937
Indirect Costs	4,136
Travel and Allowances	17,833
Other Direct Costs	905
Materials and Supplies	400
	<hr/>
	37,702

Sincerely yours,

  
Stanley F. Miller  
Director

SFM:mw

Approved:

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**TIME-PHASED WORK PLAN**  
**WEED CONTROL SYSTEMS FOR REPRESENTATIVE FARMS**  
**IN DEVELOPING COUNTRIES**

USAID/OSU WEED CONTROL PROJECT, AID/CM/ta-C-73-23

**Preface**

The AID-supported Oregon State University research project has as its major objective the reduction of food crop losses due to weeds in tropical countries. The project is designed to develop new weed control technologies and evaluate these in terms of such multiple goals as improved labor utilization, more equitable income distribution and economic efficiency.

For clarity and ease of discussion, the work plan will be divided into four sections:

- I. Northeast Brazil
- II. Central America
- III. Corvallis-based Staff
- IV. General Analytical Design of Socio-Economic Studies

However, in actual practice all of these phases will be integrated into one coordinated effort.

## I. NORTHEAST BRAZIL

The work plan time period is from March 1973 through June 1976 and is divided into four sections:

- A. March 1973 through December 1973 - a period of preparation in which the agronomists will locate in Recife, Pernambuco, Brazil and initiate activities to identify and characterize the agronomic, economic and social aspects of the farm community and the agricultural labor force.
- B. January 1974 through December 1974 - the first crop year.
- C. January 1975 through December 1975 - the second crop year.  
These two crop years will be utilized in generating, collecting, processing and evaluating data to achieve project goals.
- D. January 1976 through June 1976 - the last period will be used to finalize the evaluation of such data and to publish results.

Attainment of project goals within the approved contract period, March 1, 1973 through December 31, 1975, will be impossible because 1975 crop year's harvest season extends late into the calendar year. Sufficient processing and integration of all data and the compilation of a report on research conducted to date (late 1975) will necessitate a project extension until June 1976.

The work to be accomplished during the 1974 and 1975 crop seasons will concentrate on what we believe to be the most critical issues. Undoubtedly on-site experience will give rise to research needs which have not been anticipated and cannot be adequately assessed

within the time period of this contract. A subsequent decision will be made after these two years as to whether the program should be terminated at that date or whether an extension of the contract should be made.

A. 1973 (March through December)

1. identify, secure and ship needed equipment
2. study research site and make initial contacts 1/
3. two agronomists arrive and establish, ETA July
4. one agricultural economist arrive and establish. ETA unknown at this point, pending further developments in staffing.
5. contact personnel of USAID, Ministry of Agriculture, IPEANE, other institutions, industry, etc.
6. establish linkages with other Brazilian and international research organizations as necessary
7. obtain counterparts, secretary, physical facilities and other logistic support
8. review pertinent agronomic, economic and social literature and secondary data
9. observe and catalog soil, climate, cropping practices, weed

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1/ The agronomist, Fisher, will make an on-site study of the research area late April-early May to facilitate later arrival of both agronomists, Shenk and Fisher. The purposes of the trip are to: alert USAID, Ministry of Agriculture and U.S. Consulate officials of arrival, arrange for importation of equipment, identify cooperators, secure facilities and counterparts, survey weed problem, review research literature and statistics on state of Pernambuco, et

problems of major food crops and noncrop areas such as irrigation channels, roadsides, etc., and existing weed control techniques

10. specify project research areas
  11. determine crops to be studied
  12. identify and plan field trials
  13. enumerate farm populations and stratify by farm size
  14. identify agricultural labor force
  15. develop and pretest farm questionnaires
  16. develop and pretest agricultural labor force questionnaires
  17. locate cooperators for field locations
3. 1974 (January through December)
1. establish field trials at several predetermined locations to study:
    - a. yield losses due to weed competition
    - b. optimal time(s) and techniques of mechanical and manual weeding (critical period(s) of weed competition)
    - c. herbicide selectivity
    - d. crop density, i.e., effects of increasing crop competition (towards weeds) by adjusting planting densities through inter- and intra-row spacing of plants
    - e. variety-fertility-competition interactions
    - f. integrated weed control including combinations of manual, cultural, chemical and biological methods
  2. conduct farm and labor surveys
  3. estimate cross-sectional production functions by farm size
  4. obtain preliminary estimates of substitution rates between capital

and labor employed in weed control

5. identify characteristics of the labor pop.
6. evaluate costs of alternative weed control methods
7. initiate construction of generalized quantitative model to be used for the development of economically-efficient weed control systems and evaluation of alternative social goals

C. 1975 (January through December)

1. select, refine and repeat promising 1974 field trials
2. expand research into cultural practices such as continuous, multiple and inter-cropping; chemical and mechanical fallow, cover crops, tillage, and mulching
3. install trials on crops not included in prior studies
4. resample farm and labor populations to obtain characteristics over time as needed
5. complete development of generalized quantitative model
6. specify beginning parameters and technical coefficients of the model from field trials and farm and labor surveys
7. generate initial estimates of optimal weed control systems by farm size

D. 1976 (January through June)

1. evaluate and integrate project data
2. refine parameters and technical coefficients of the model and generate final estimates of the optimal production systems by farm size
3. relax the economic efficiency criterion to obtain alternative

social goals and estimate costs in terms of change in regional net farm incomes.

4. prepare and submit reports and publications on project research conducted to date

Research results generated within this project will be utilized not only in Brazil, but also in other developing nations possessing conditions similar to those of northeast Brazil. Within Brazil scientific papers will be presented at meetings such as The Brazilian Herbicide and Weed Society, seminars will be presented and several practical courses in weed control research methods will be organized. These short courses and other forms of utilization of research information can also be realized through cooperation with other weed research institutes throughout the world.

A number of project activities which have no definite schedule will be initiated and continued as required. These will probably include:

training counterparts, increasing weed research capabilities of Brazilian institutions, developing new and economical weed control methods (and putting these into practice), preparing publications, acting as an information and back-up source for other USAID missions, preparing reports, consulting with Brazilian government agencies, attending scientific meetings in Brazil, in the U.S. and abroad, etc.

## II. CENTRAL AMERICA

### A. Broad Goals

1. Greater emphasis on the study of the socio-economic systems as influenced by the new technology of weed control. Methodology will be closely coordinated with the Agricultural Economist in Corvallis and exchange of results and data with the project in Brazil.
2. Integrated control of weeds will receive special attention to minimize the use of chemical weed-killers.
3. Effects of weed control procedures will reflect concern for the environment.

### Time-Phased Work Plan

1. April - December, 1973
  - a. Complete the editing, layout, proofreading and final printing of Weeds of Central America book. Copies will be distributed to all Agricultural Ministries in Central America assuring that each appropriate extension agent in each country receives a copy.
  - b. Complete the writing of weed control recommendation bulletins for sorghum, beans, corn, wheat, potatoes, and rice in Guatemala, Nicaragua, and Costa Rica. These recommendations are based on research already conducted by this project.
  - c. Conduct studies comparing integrated weed control methods using herbicide recommendations already developed by this project, alone and in combination with manual and cultural methods in beans, corn, sorghum, and rice. Economic comparisons of inputs and yields from each method will be made.

- d. Complete field trials and initiate preparation or recommendation bulletins for melons, citrus, peanuts, potatoes and tomatoes in El Salvador.
- e. Continue studies on relative competition from weeds under several weed control practices, especially in beans, corn, sorghum, and rice.
- f. Research will be initiated for weed control in pastures and in several horticultural crops such as peppers, carrots, cabbage, and others. These crops are grown in volume during the time when coffee, cotton, and sugar cane are being harvested, thus leaving little or no labor to plant and weed these crops. This activity is especially desired by the Ministries of Agriculture in Central America.
- g. Begin preliminary surveys to collect data to be used in socio-economic studies.
- h. Continue to help supervise and train counterparts throughout Central America.

January - December, 1974

- a. Complete the publication and distribution of recommendation bulletins for weed control in sorghum, beans, corn, wheat, potatoes, and rice in Guatemala, Nicaragua, and Costa Rica.
- b. Complete publication and distribution of recommendation bulletins for melons, citrus, peanuts, potatoes, and tomatoes in El Salvador.
- c. Intensify data collection for socio-economic studies--distribute questionnaires, review available statistics, etc.

- d. Continue evaluation of integrated weed control methods for pastures and several horticultural crops including economic evaluation of relative inputs and outputs in selected crops.
- e. Continue to help supervise and train counterparts throughout Central America.

3. January - December, 1975

- a. Develop recommendation bulletins for certain of the horticultural crops and pastures in El Salvador.
- b. Cooperate in analysis of data for socio-economic studies and help in collecting further data if required.
- c. Continue economic evaluation of integrated control methods in certain horticultural crops.
- d. Continue to help supervise and train counterparts throughout Central America. As the contract period nears termination, attempts will be made to assure that counterparts are in the best possible situation to carry on weed control efforts more or less independently.

January - June, 1976

- a. Evaluate and integrate project data.
- b. Prepare and submit reports and publications on project research conducted to date.

### III. CORVALLIS-BASED STAFF

The primary justification for the Corvallis-based staff is to provide all possible support for the field staff, to keep the program running smoothly through liaison with AID Washington, and to help assure broad utilization of results from the field. General duties of each staff member are listed below. Specific activities might vary periodically depending on the needs of the program.

#### A. Project Leader

This position is to be assigned to the Home-Based Agricultural Economist who will devote one third of his time to administrative duties including the coordination of project inputs from the OSU Agronomic Crop Science and Agricultural Economics Departments' staff: budget management. He will have the primary responsibility for contacts with USAID and other national and international weed research organizations. The Project Leader will also maintain close liaison with the University of California AID Pest Management and Related Environmental Protection project.

#### B. Technical Support Agronomist

Primary functions of the Corvallis based agronomist is to provide technical and physical support for in-field agronomists. This will be accomplished through the following activities:

1. Keep field staff informed of current developments, trends, and activities in weed control by constant reviewing of literature and by travel to maintain contact with key U.S. and international weed control groups. A partial list of proposed travel is included in item 8.
2. Assist field staff in planning their activities by making periodic trips to Brazil and El Salvador.
3. Rewrite a weed control research guide which has been in constant demand but is out of print and needs revision.
4. Annually prepare a listing by crop of promising experimental herbicides.
5. Conduct three field trials annually to provide preliminary evaluation of experimental herbicides.
6. All the above activities provide a resource which allows Corvallis staff to respond to requests for weed control information by individuals from many areas of the world.
7. Supervise project technician who is responsible for ordering, designing, building, and shipping equipment and supplies needed by field staff.
8. Travel to meetings and contract countries as follows:
  - a. Third International Symposium on Tropical Root Crops, Ibadan, Nigeria - - - December 2-9, 1973.

Conference will be held at International Institute of Tropical Agriculture (IITA). This will provide an opportunity to exchange information with Dr. Keith Moody who does the weed control research at IITA.

- b. Two or three trips will be made to Central America and Brazil during contract period. Actual dates will depend on needs and schedule of field agronomists.
- c. British Weed Control Conference, Brighton, England - - - November, 1975.
- d. Annual Conference of Weed Science Society of America, Las Vegas, Nevada - - - February 12-14, 1974, Washington, D. C. - - - February 4-6, 1975.
- e. Annual Conference of Southern Weed Science Society, Atlanta, Georgia - - - January 22-24, 1974, Memphis, Tennessee - - - January 20-23, 1975.
- f. Hyacinth Control Society, New Orleans, Louisiana - - - July 15-18, 1973.
- g. Asian-Pacific Weed Science Society Conference, Japan, 1975.

### C. Project Technician

Primary function of the Corvallis based technician is to assist Corvallis staff in providing for all the needs of the field staff

- 1. Order, design, build, and ship equipment and supplies for field staff.

2. Carry out day-to-day field activities involved with herbicide screening trials.
3. Assist in reviewing and organizing weed control literature.
4. Assist in preparation of visual aids through photography for use in overseas workshops, demonstrations, etc.

**D. Information Specialist**

The overall objective is to implement and insure broader and more rapid utilization of the information developed through research conducted by the USAID/OSU Weed Research Project, with an ultimate target of smaller farmers in developing countries. The following activities are designed to achieve this objective:

1. Work with and advise project staff on the publication and distribution of weed control research performed in Brazil and Central America.
2. Collect material, prepare and edit copy, layout, and expedite production of the IPPC INFOLETTER no less than quarterly, incorporating information concerning weed control research and related applicable topics; oversee distribution of INFOLETTER.
3. Assume responsibility for maintaining and refining a mailing list of weed researchers in developing (and other) countries worldwide; as well as USAID Missions, and other cooperating institutions and individuals.

4. Service information requests from project field staff, USAID Missions, and researchers in developing countries, coordinating response with other project support personnel, or as directed by them.
5. Work jointly with project staff in researching, editing, and publishing material aimed at fulfilling weed control research information needs in developing nations. Possibilities under consideration include: a revision of the Weed Research Methods Manual, currently out of supply, but still in demand judging from requests continuing to be received; either an expanded section of a revised weed research methods manual, or a separate publication focusing on manual/mechanical techniques and equipment for weed control; a revised edition of the Herbicide Use and Nomenclature Index; a publication dealing with integrated weed control methods; a leaflet on the importance and methods of seed cleaning (as a weed prevention technique).
6. Oversee continuing worldwide distribution of weed control research-related publications stored at OSU.
7. Act as liaison with OSU Public Information Office, mass media, and other channels as warranted and applicable.
8. Assist in the preparation of reports, both technical and periodic, and proposals.
9. Continue worldwide search for more information on weed control techniques, equipment (manual and mechanical), researchers, meetings, etc.

The work for this office is varied and continuous, but would be difficult to fit into a dated work plan. It includes the following facets, among others:

**1. Budgeting**

- a. Prepare budgets in consultation with the Director, for new proposals and extensions of existing contract, including salary computations.
- b. Coordinate project activities with University offices concerned, including department, OSU Experiment Station and Business Office.
- c. Report on budget balances to Contract Office.

**2. Translation**

- a. Translate orders and other letters from Spanish and Portuguese to English.
- b. Prepare and/or supervise preparation of Spanish translations of speeches or reports.
- c. Assist staff members with language problems such as arranging for language instruction, contacting possible tutors, finding suitable text books, or making contact with the Modern Language Department of the University.

**3. Fiscal**

- a. Be responsible for preparing requisitions and keeping record of expenditures on Agency for International Development Contract account.
- b. Check monthly ledger statements from the Business Office.
- c. Report to the Business Office the classification of expenditures for monthly billing to AID Contract Office.

- d. Prepare requisitions to repay Revolving Funds of overseas projects, including translating invoices and figuring dollar equivalents of national currency.
  - e. Deposit checks in bank for Revolving Fund reimbursements.
  - f. Keep records of expenditures and report back to overseas project leaders.
  - g. Make quarterly reports to Business Office on condition of Revolving Fund accounts.
4. Publications
- a. Read copy and proofread materials to be published, including Annual Report, proposals and others.
  - b. Record and deposit money from sales of publications.
5. General
- a. Be familiar with University procedures and details of Contract between OSU and AID in order to stay within guidelines laid down for expenditures and personnel, and advise project personnel accordingly.
  - b. Assist with procedures for shipping materials, equipment and household goods, including arrangements with packing, storage and transportation companies.
  - c. Prepare University appointment forms for academic and classified personnel according to University and Personnel Division rules.
  - d. Interview prospective clerical employees.
  - e. Prepare travel authorization requests for out-of-state and foreign travel in accordance with University requirements.

- f. Supervise travel arrangements for staff including scheduling, obtaining visas, etc.

**F. Agricultural Economist**

Two-thirds of the time of the Agricultural Economist will be devoted to the supervision and conduct of the socio-economic phases of this project. This will entail periodic trips to Latin America to consult with in-field staff and to collect data. The analytical design of the socio-economic component is described in Section IV immediately following.

#### IV. GENERAL ANALYTICAL DESIGN OF SOCIO-ECONOMIC STUDIES

Research relating to the socio-economic aspects of weed control under this project will be concentrated in northeastern Brazil with some supporting advisory services available as needed to project personnel located in Central America. Accordingly, the time-phased work plan presented below refers to the program in Brazil.

The objectives of the project are to (1) identify economically efficient and feasible methods of weed control for representative farms in the study area and (2) to evaluate the effects of alternative methods of weed control on the levels of agricultural production, income and labor employment in the study area. To meet these objectives a model of the agricultural (farm and labor force) economy of the area will be developed. The model will use data from secondary sources where available, with agronomic experiments conducted under this project and interviews with one selected farmer and labor force participants in the study area. One element of this model will consist of a number

of representative farm models differentiated by size, income level, asset values, input use, output levels, etc. Another element will involve specification of labor differentiated by such characteristics as education, skill levels, etc.

Each model farm will be structured to reflect prevailing resource (constraint) levels, production activities, and product-factor relationships of farms in the appropriate stratum in the study area. In addition, activities-- particularly weed control activities not currently prevailing in the area-- will be incorporated in the individual farm models. Such activities will be identified on the basis of agronomic research conducted under this project. From these models a determination of optimum production systems, particularly weed control systems, can be determined under varying conditions of product and factor prices and resource constraints for each class of farm. Consequently, it will be possible not only to identify optima under existing conditions but also the nature of changes in prices and/or constraints necessary to induce changes from prevailing practices to other specified alternatives. Of particular importance will be the effects of such changes on the levels and types of labor employment resulting from such price and/or constraint changes.

Area effects will be determined by weighting individual farm effects according to the importance of each farm type in the study area and aggregating. It is anticipated that the resulting aggregate model will permit one to identify not only the costs, if any, in terms of employment, income distribution, etc.

of attaining economically efficient production; but, conversely, the costs in terms of economic efficiency of achieving some other policy objectives such as a given level of labor employment.

The time frame anticipated for the conduct of this research effort is identified below.

A. 1973 (March through December):

1. identification and review of literature bearing upon the economic and social structure of the agricultural (farm and labor) sector of the study area;
2. enumeration and stratification by size and type of the farm population; identification of the relevant agricultural labor force in the area; development of appropriate farm and labor questionnaires, sampling design and pretests of the questionnaires;
3. assist agronomists in identification and design of appropriate agronomic experiments.

B. 1974 (January through December)

1. conduct farm and labor surveys.
2. construct model farm for each stratum on the basis of the data obtained through survey and secondary sources;
3. identify optional production systems for each model farm. These systems will reflect only the technological alternatives currently employed in the area;
4. assist agronomists in determining output response functions to alternative weed control practices under experimentation; initiate

specification of alternative weed control activities to be incorporated in the individual farm models;

initiate development of the aggregate area model.

C. 1975 (January through December )

1. resample as needed farm and labor populations to identify, to the extent possible, errors in the components of the models associated with time (e.g., the effects of weather on product-factor relationship);
2. refinement of output response functions on the basis of additional experimental results;
3. generate preliminary estimates of optimal weed control systems by farm size;
4. complete specification of the aggregate model.

D. 1976 (January through June)

1. finalize parameters of individual farm models on the basis of further agronomic investigations and generate final estimates of optimal production systems by farm size;
2. determine area impacts of achieving economic efficiency on labor employment, income distribution and/or other socially relevant policy objectives;
3. determine the costs in terms of agricultural production, farm income, etc., of implementing alternative policy objectives such as the level of employment, income redistribution, etc.

June 25, 1973

AGENCY FOR INTERNATIONAL DEVELOPMENT  
RESEARCH ADVISORY COMMITTEE

Minutes of the Thirty-ninth Meeting  
(November 8-9, 1972)

4. Weed Control Systems for Representative Farms  
in Developing Countries - Oregon State University  
Project Extension

Dr. Heady, Chairman of the Subcommittee, recounted the considerable project accomplishments; commented on the several intensive reviews of the project; and stated that the major recommendations of these reviews have been incorporated into the project statement. The Subcommittee believes that the socio-economic component of this research is not focusing on major problems. Dr. Heady suggested stronger emphasis on economics, but he felt that the research is too large to be handled effectively by one man. Emphasis should be placed on research on basic problems of weed control. This would minimize the numerous field trials many of which are primarily refined demonstrations which might have value as training guides for local scientists, but less value as sources of research information.

Dr. Heady observed that the technical assistance component received too much attention. However, he spoke favorably of the accomplishments in training of personnel and linkages with LDCs. In conclusion, he suggested that the project should have a time-phased plan, and he felt that the proposed budget is too low to accomplish the project goals. Dr. M. Peterson agreed with Dr. Heady's presentation. He added that Oregon State University emphasized too much the chemical weed control. He agreed that training and technical assistance phases of the project were commendable. Dr. M. Peterson observed that on-campus activities were too large in comparison to total project work. Dr. Whitney was impressed with project accomplishments, but he felt that the new project statement attempts to incorporate all the suggestions from reviews, and this expanded scope cause confusion in the activity, especially since the added socio-economic component is unbounded.

Dr. Montgomery also expressed concern about the socio-economic dimension of the project. He suggested that considerations should be given to the examination of the socio-economic impact by applying the science and technology assessment criteria. Dr. Adams indicated that the project statement has a number of serious shortcomings for planning and execution of the program. In general he agreed with Dr. Heady's evaluation.

Dr. Frank while agreeing with Dr. Heady's presentation, felt that too much time and effort are devoted to collection and dissemination of information. He was not convinced from the proposal that Oregon State University has the necessary competency in the socio-economic area.

Dr. Ruttan expressed satisfaction with the Oregon State University capacity in the field of economics but doubted that the project will receive the economic inputs it really needs. He sees a low level of effort applied to this project area, and he felt that LDCs or the chemical companies could do the job. He concluded by saying that the project statement as now structured makes it difficult for him to vote favorably.

Dr. Kramer felt that weed problem is important to the AID program and thus AID should support this kind of activity. He observed that the socio-economic phase is so broad that it will require a large staff and commensurate funding to do it satisfactorily.

Dr. Long discussed the gist of the recent project reviews in which the main theme was to design technology to meet the weed problem of average farmers. Dr. Kelley felt that the concern with socio-economic implications might also be applied to other biological projects. Thus, this proposed investigation might be considered to be a model for other research in agriculture. Dr. Couty explained the approach TA/AGR is proposing to bring the project in line with current socio-economic concern. Dr. Montgomery stressed again that the problem is not within micro-or macro-economic research but that it pertains to the science-and-technology-type of assessment which will determine parameters and provide a basis for policy decision as to what should be maximized and what should be minimized.

Dr. M. Peterson felt that since the project is important to AID objectives RAC might want to look at it favorably but RAC might suggest that AID realign the project to encompass present needs.

Dr. Heady offered a motion which was seconded by Dr. M. Peterson, then amended as given below. Dr. Adams, proposed that if the contractor does not satisfy the RAC request, the project should be terminated. RAC offered to help with development of project objectives, if AID so requests.

Dr. M. Peterson offered an amendment to the effect that the RAC Subcommittee work with AID and Oregon State University on a continuous basis until the project is satisfactorily developed. (This amendment was seconded by Dr. D. Peterson.)

Dr. Montgomery suggesting that RAC might not have the required expertise, proposed a modification to the effect that a technology

assessment group from the National Academy of Sciences meet with AID and the contractor to consider and recommend whether the socio-economic phase has sufficient relevance to this and other related AID research projects. This change in the amendment was accepted by a vote of 13 for and 1 against.

Motion: RAC recommends extension of the project for three years, provided the RIGC request for a time-sequenced work plan by July 1, 1973 is met, and also provided, that the work plan adequately reflect the recommendations of the project review of 1972 and be of finite nature with specific objectives. RAC also recommends that AID hold a seminar with a group from the National Academy of Sciences that is working on technology assessment in order to see if the technology assessment work has relevance for this and other AID research projects.

(Moved by Dr. Heady and amended by Dr. Montgomery) Motion carried: for-12; against-3

AID 1330-1  
(7d-24)

PRO AG

**PROJECT AGREEMENT**  
 BETWEEN THE DEPARTMENT OF STATE, AGENCY FOR INTERNATIONAL DEVELOPMENT (AID),  
 AN AGENCY OF THE GOVERNMENT OF THE UNITED STATES OF AMERICA, AND  
 MINISTRY OF AGRICULTURE, CINGRA, SUBIN

10p

AN AGENCY OF THE GOVERNMENT OF BRAZIL

The above-named parties hereby mutually agree to carry out a project in accordance with the terms set forth herein and the terms set forth in any annexes attached hereto, as checked below:

1. PROJECT/ACTIVITY NO. <u>Contract AID/csd - 1442</u>	PAGE 1 OF 10 PAGES
2. AGREEMENT NO.	3. <input checked="" type="checkbox"/> ORIGINAL OR REVISION NO.
4. PROJECT/ACTIVITY TITLE	

ARDO  
*Wah*

<input checked="" type="checkbox"/> PROJECT DESCRIPTION ANNEX A	<input type="checkbox"/> FOREIGN CURRENCY STANDARD PROVISIONS ANNEX
<input type="checkbox"/> STANDARD PROVISIONS ANNEX	<input type="checkbox"/> SPECIAL LOAN PROVISIONS ANNEX

**Weed Control Research**  
 931-17-130-463

This Project Agreement is further subject to the terms of the following agreement between the two governments, as modified and supplemented:

PROG  
*Bl*

<input checked="" type="checkbox"/> GENERAL AGREEMENT FOR TECHNICAL COOPERATION	DATE Dec. 19, 1950
<input type="checkbox"/> ECONOMIC COOPERATION AGREEMENT	DATE

5. PROJECT DESCRIPTION AND EXPLANATION  
 (See Annex A attached)

EXO  
*Rum*

<input checked="" type="checkbox"/> (other) Special Technical Services Agreement	DATE May 30, 1953
--	----------------------

6. AID APPROPRIATION SYMBOL	7. AID ALLOTMENT SYMBOL
-----------------------------	-------------------------

CONT.  
*MJ*

8. AID FINANCING	PREVIOUS TOTAL (A)	INCREASE (B)	DECREASE (C)	TOTAL TO DATE (D)
<input type="checkbox"/> DOLLARS <input type="checkbox"/> LOCAL CURRENCY				
(a) Total				
(b) Contract Services				
(c) Commodities				
(d) Other Costs				
9. COOPERATING AGENCY FINANCING - DOLLAR EQUIVALENT				
01.00=				
(a) Total				
(b) Technical and other Services				
(c) Commodities				
(d) Other Costs				

Distribution:  
 AID/W 16  
 PRPC -6  
 SUBIN-6  
 ARDO-3  
 CONT-4  
 PER  
 GSO  
 EKO  
 C&R  
 LGS- 3  
 RIO-3

10. SPECIAL PROVISIONS (Use Additional Continuation Sheets if Necessary)

11. DATE OF ORIGINAL AGREEMENT June 11, 1953	12. DATE OF THIS REVISION	13. ESTIMATED FINAL CONTRIBUTION DATE
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14. FOR THE COOPERATING GOVERNMENT OR AGENCY  SIGNATURE: <i>[Signature]</i> DATE: _____	15. FOR THE AGENCY FOR INTERNATIONAL DEVELOPMENT  SIGNATURE: _____ DATE: _____ TITLE: _____
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AID 100-1A (2-70)  PRO AG CONTINUATION SHEET  ANNEX	<b>PROJECT AGREEMENT</b> BETWEEN AID AND <b>MINISTRY OF AGRICULTURE, CINGRA,</b> <b>SUBLIH</b>	1. Project/Activity No. <b>Contract AID/csd-1442</b>	PAGE <u>2</u> OF <u>10</u> PAGES
	AN AGENCY OF THE GOVERNMENT OF  <b>BRAZIL</b>	2. Agreement No.	3. <input checked="" type="checkbox"/> Original or Revision No. _____
		3. Project/Activity Title  <b>Weed Control Research</b>	

**I. PARTES DESSE CONVÊNIO**

São partes do presente Convênio o Ministério da Agricultura (o Ministério); a Coordenação de Assuntos Internacionais de Agricultura (CINGRA); a Secretaria de Cooperação Econômica e Técnica Internacional (SUBLIH), do Ministério do Planejamento e Coordenação Geral e a Agência Norte-Americana para o Desenvolvimento Internacional (USAID).

**II. OBJETIVOS**

De conformidade com o contrato AID/csd-1442, a USAID, através deste contrato com a Universidade Estadual de Oregon, prestará colaboração técnica ao Departamento Nacional de Pesquisa Agropecuária (DNEPA), em um Programa de Pesquisa para o Controle de Ervas Daninhas, cujo objetivo principal é reduzir os prejuízos nas culturas, causados pelas ervas daninhas, nos países tropicais, com ênfase nas culturas para alimentação humana. O projeto está delineado para desenvolver nova tecnologia para o controle de ervas daninhas e para avaliar esta tecnologia em termos de objetivos múltiplos ou seja, eficiência econômica, distribuição da renda, e deslocamento de mão de obra.

As prioridades de pesquisa sob este contrato são as seguintes:

**I. PARTIES TO THIS AGREEMENT**

The parties to this agreement are the Ministry of Agriculture (the Ministry); the Office of the Coordinator of International Affairs in Agriculture (CINGRA); the Secretariat for International Economic and Technical Cooperation (SUBLIH), of the Ministry of Planning and General Coordination, and the United States Agency for International Development (USAID).

**II. OBJECTIVES**

In accordance with the (AID/EAB) contract AID/csd-1442, USAID, through its contract with Oregon State University, will provide technical collaboration to the National Department of Agricultural Research (DNEPA), in a Research Program for weed control, whose major objective is to reduce crop losses due to weeds in the tropical countries with emphasis on food crops. The project is designed to develop new weed control technology and to evaluate such technology in terms of multiple goals such as economic efficiency, income distribution and labor displacement.

Research priorities under this contract are:

For the Cooperating Government or Agency		For the Agency for International Development	
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TITLE: _____		TITLE: _____	

AID 122 D-1A E-701	PROJECT AGREEMENT BETWEEN AID AND MINISTRY OF AGRICULTURE, CINGRA SURYA AN AGENCY OF THE GOVERNMENT OF BRAZIL	1. Project/Activity No. Contract AID/csg-1442	PAGE 3 OF 10 PAGES
		2. Agreement No.	3. <input checked="" type="checkbox"/> Original or Revision No. _____
PRO AG CONTINUATION SHEET		2. Project/Activity Title Weed Control Research	
ANNEX			

1. Desenvolver informações básicas referentes ao controle econômico de ervas daninhas.

2. Avaliar os prejuízos causados pelas ervas daninhas e o custo/benefício dos sistemas e métodos existentes no controle de ervas daninhas para as principais culturas em nível da propriedade rural.

3. Quando viável, desenvolver métodos manuais, mecânicos, culturais, químicos e biológicos para o controle de ervas daninhas, individualmente ou em combinação, e integrado com outras práticas de manejo, tais como utilização de variedades melhoradas, fertilizantes, calagem, controle de pragas, irrigação, época de plantio e densidade das plantas.

4. Avaliar os métodos para controle de ervas daninhas em termos de sua eficiência econômica. Será levado em consideração o tamanho da propriedade agrícola, culturas, estações, disponibilidade de mão-de-obra, e variações regionais dentro do País. Uma vez que os métodos econômicos para o controle de ervas daninhas são determinados por uma dada situação, a atenção será focalizada para os custos privados e sociais em conexão com o afrouxamento da eficiência ou critério de custos mínimos para alcançar os objetivos desejados.

1. Develop basic information concerning economical weed control.

2. Evaluate weed losses and the costs and benefits of existing methods and systems of weed control for major crops at the farm level.

3. Where feasible, develop sound methods of manual, mechanical, cultural, chemical and biological weed control, singly or in combination and integrated with other management practices such as improved seed, fertilizer, lime, pest control, irrigation, planting date and crop density.

4. Evaluate weed control methods in terms of their economic efficiency. Consideration will be given to farm size, crops, seasons, labor availability and regional variations within the country. Once the economical weed control method is determined for a given situation, attention will be focused on private and social costs associated with relaxing the efficiency or least cost criteria to achieve other desired goals.

For the Cooperating Government or Agency

For the Agency for International Development

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TITLE: \_\_\_\_\_

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AID PROJ-1A (2-70)	PROJECT AGREEMENT BETWEEN AID AND MINISTRY OF AGRICULTURE, CINGRA, SUBIN	1. Project/Activity No. Contract AID/csd-1442	PAGE 1 OF 10 PAGES
		2. Agreement No.	3. <input checked="" type="checkbox"/> Original or Revision No. _____
	AN AGENCY OF THE GOVERNMENT OF  BRAZIL	3. Project/Activity Title  Weed Control Research	

5. Promover o uso de herbicidas menos prejudiciais à vida humana e animal.

5. Promote the use of herbicides least hazardous to human and animal life.

6. Reforçar as ligações entre a pesquisa e a extensão com as instituições educacionais brasileiras no treinamento de especialistas no controle de ervas daninhas.

6. Reinforce Brazilian research and extension linkages with educational institutions in the training of weed control specialists.

7. Encorajar os agrônomos e economistas agrícolas brasileiros com potencial para liderança científica a seguir um treinamento avançado.

7. Encourage Brazilian agronomists and agricultural economists with potential scientific leadership to pursue advanced training.

8. Acelerar a publicação de informações básicas sobre controle de ervas daninhas desenvolvidas pelos brasileiros counterparts e pelo pessoal do projeto.

8. Urge publication of basic weed control information developed by Brazilian counterparts and project personnel.

III. FINALIDADES

III. PURPOSE

A finalidade deste documento é a de definir as responsabilidades do Governo do Brasil (GOB), através do Ministério da Agricultura, que nesta caso específico atuará representado pelo Departamento Nacional de Pesquisa Agropecuária (DNEPA), e da Agência Norte Americana para o Desenvolvimento Internacional (USAID) através do seu "Bureau" de Assistência Técnica (TAB), no

The purpose of this document is to define the responsibilities of Government of Brazil (GOB), through the Ministry of Agriculture, who in this specific case will act represented by the National Department of Agricultural Research (DNEPA), and of the United States Agency for International Development (USAID), through its Technical Assistance Bureau (TAB), in

For the Cooperating Government or Agency

For the Agency for International Development

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AID 1530-1A (12-70)  PRO AG CONTINUATION SHEET  ANNEX	<b>PROJECT AGREEMENT</b> BETWEEN AID AND <b>MINISTRY OF AGRICULTURE, CINGRA</b> <b>SUBIN</b>	1. Project/Activity No. <b>Contract AID/csd-1442</b>	PAGE 5 OF 10 PAGES
	ALL AGENCY OF THE GOVERNMENT OF  <b>BRAZIL</b>	2. Agreement No.	3. <input checked="" type="checkbox"/> Original or Revision No. _____
		3. Project/Activity Title <b>Weed Control Research</b>	

fornecimento de técnicos, recursos materiais e apoio logístico, com a finalidade de desenvolver um Programa de Pesquisa Sobre o Controle de Ervas Daninhas principalmente em culturas para alimentação humana e também em outras importantes culturas do Brasil, tais como pastagens, mandioca, etc., ditadas pelas regiões do Brasil nas quais a pesquisa será conduzida.

providing technicians, material and logistical support, aiming at the development of a Research Program in Weed Control, principally on food crops, but also on other important Brazilian crops as pastures, manioc, etc., dictated by the region(s) in which research will be conducted.

**IV. PLANO DE AÇÃO**

**IV. PLAN OF ACTION**

A pesquisa para o controle de ervas daninhas, dos termos deste Acordo, será conduzida pelo DNEPA, em cooperação com a Universidade Estadual de Oregon, com o trabalho de campo a ser inicialmente empreendido pelo Instituto de Pesquisa Agropecuária do Nordeste (IPEANE), localizado em Recife, Estado de Pernambuco.

The weed research under this agreement will be conducted by DNEPA cooperatively with Oregon State University, with field work to be undertaken initially by the Northeast Agricultural Research Institute, IPEANE, located in Recife, State of Pernambuco.

O enfoque da pesquisa está nas seguintes culturas: milho, sorgo, feijão, arroz, mandioca, cana-de-açúcar e pastagens. A pesquisa de controle de ervas daninhas, não tem sido enfatizada. Não há no Instituto pesquisador em controle de ervas daninhas, trabalhando em regime de tempo integral.

The current focus of research is on the following crops: corn, sorghum, beans, manioc, rice, sugarcane and pastures. Research in weed control has not been emphasized. There is no full-time weed researcher within this institution.

Os objetivos das atividades incluirão:

The following scope of activities will include:

(1) Desenvolvimento de informações sobre métodos manuais, mecânicos, culturais, químicos e biológicos para o controle de ervas daninhas.

(1) Development of information on mechanical, cultural, chemical, biological and manual methods for weed control and their relationship to

For the Cooperating Government or Agency

For the Agency for International Development

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TITLE: \_\_\_\_\_

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AID 133 OF 1A (8-70)  PRO AG CONTINUATION SHEET  ANNEX	<b>PROJECT AGREEMENT</b> BETWEEN AID AND <b>MINISTRY OF AGRICULTURE, CINGRA,          SUBIN</b>	1. Project/Activity No. <b>Contract AID/csd-1442</b>	PAGE <b>6</b> OF <b>10</b> PAGES
		2. Agreement No.	3. <input checked="" type="checkbox"/> Original or Revision No. _____
	AN AGENCY OF THE GOVERNMENT OF  <b>BRAZIL</b>	3. Project/Activity Title  <b>Weed Control Research</b>	

minhas e sua relação aos custos de produção, rendimento e necessidade de mão-de-obra, com ênfase nas pequenas propriedades agrícolas.

production costs, yields and labor requirements, with emphasis on typical family farms.

(2) Análise de custos relativos ao custo/benefício.

(2) Analysis of the data relative to cost/benefits.

(3) Desenvolvimento de sistemas ideais para controle de ervas daninhas baseados sobre todos os fatores, incluindo técnicas para controle de ervas daninhas.

(3) Development of optimum weed control systems based upon all factors, including weed control techniques.

(4) Cooperação com outros projetos econômicos envolvendo metodologia de análise setorial para estimar as implicações sócio-econômicas e o impacto da nova tecnologia no emprego e na renda.

(4) Cooperation with other related economic projects involving sector analytical approaches toward estimating socio-economic implications and the impact of new technology on employment and income.

(5) Treinamento de contrapartes em métodos efetivos para o controle de ervas daninhas.

(5) Training of counterparts in effective methods of weed control research.

(6) Promoção do uso prático e seguro de herbicidas e outros pesticidas.

(6) Promotion of practical and safe usage of herbicides and other pesticides.

For the Cooperating Government or Agency

For the Agency for International Development

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**PROJECT AGREEMENT**

BETWEEN AID AND  
**MINISTRY OF AGRICULTURE, CINGRA,  
SUDEN**

AN AGENCY OF THE GOVERNMENT OF  
**BRAZIL**

1. Project/Activity No.  
**Contract AID/csd-1442**

PAGE **7** OF **11** PAGES

2. Agreement No.

3.  Original or  
Revision No. \_\_\_\_\_

3. Project/Activity Title

**Weed Control Research**

**V. RESPONSABILIDADES**

**A - Da Agência Norte-Americana  
para o Desenvolvimento  
Internacional (USAID) :**

(1) Através do seu contra-  
to AID/csd-1442 com a Universidade  
Estadual de Oregon, a USAID concor-  
da em prover : -

a) dois agrônomos especi-  
alizados em controle  
de ervas daninhas, em  
tempo integral, a se-  
rem localizados no  
Nordeste do Brasil.

b) Um Economista Agríco-  
la para trabalhar com  
o projeto.

c) Fornecimentos suple-  
mentares e equipamen-  
to necessário para  
este projeto de pes-  
quisa do TAB financi-  
ado pela AID.

d) Um veículo e transpor-  
te local para o pesso-  
al do projeto.

e) Apoio do "Campus" da  
Universidade Estadual  
de Oregon.

**V. RESPONSIBILITIES**

**A - Of the United States Agency  
for International Development  
(USAID) :**

(1) Through its contract  
AID/csd-1442 with Oregon State Univers-  
ity, USAID agrees to provide:

a) two full-time U.S. agro-  
nomists specialized in  
weed control, to be sta-  
tioned in NE/Brazil.

b) One Agricultural Econo-  
mist to work with the  
project.

c) Supplementary supplies  
and equipment needed for  
this AID financed TAB  
research project.

d) A project vehicle and  
local transportation for  
contract personnel.

e) Oregon State University  
"Campus" support.

For the Cooperating Government or Agency

For the Agency for International Development

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TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_  
TITLE: \_\_\_\_\_

AID 1980-1A (3-70)  PRO AG  CONTINUATION SHEET  ANNEX	<b>PROJECT AGREEMENT</b> BETWEEN AID AND <b>MINISTRY OF AGRICULTURE, CIBRA</b> <b>SUBIX</b>	1. Project/Activity No. <b>Contract AID/cs4-1442</b>	PAGE 8. OF 10 PAGES
	AN AGENCY OF THE GOVERNMENT OF <b>BRAZIL</b>	2. Agreement No.	3. <input checked="" type="checkbox"/> Original or Revision No. _____
		3. Project/Activity Title <b>Weed Control Research</b>	

f) Auxiliar o DNPEA na coleta de informações existentes sobre o controle de ervas daninhas e na programação de futuras atividades.

f) Assist DNPEA in the collection of existing information on weed control and in the programming of future activities.

g) Estimular os agrônomos brasileiros a assumirem a responsabilidade em programas de trabalho e na coordenação de trabalhos futuros.

g) Encourage Brazilian colleagues to assume responsibility for work programs and the coordination of future work.

(2) Prover serviços tais como: consecução de "visas", importação de equipamento, veículos e objetos de uso pessoal, provimento de mobiliário e utensílios domésticos, acesso à assistência médica dos E.U., U.S., às vantagens em educação e de mais benefícios derivadas das disposições gerais do Convênio.

(2) Provide such services as facilitating visas, importation of equipment, vehicles, and personal effects; provision of furniture and appliances, and access to U.S. health and educational facilities and other benefits derived from the general provisions agreement.

Do Ministério de Agricultura:

of the Ministry of Agriculture:

(1) Prover, no mínimo 2 (dois) agrônomos competentes para trabalhar no controle de ervas daninhas e um ou mais agrônomos para atividades ligadas aos aspectos sócio-econômicos da nova tecnologia.

(1) Provide a minimum of two competent university trained agronomists to work in weed control and one or more agronomists to those activities connected with the social economic aspects of the new technology.

For the Cooperative Government of Agency  
  
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For the Agency for International Development  
  
SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

AID 1516-14 (1-75)	PROJECT AGREEMENT BETWEEN AID AND MINISTRY OF AGRICULTURE, CIEGRA, SUBIN	1. Project/Activity No. Contract AID/csd-1442	PAGE 2 OF 10 PAGES
		2. Agreement No.	3. <input checked="" type="checkbox"/> Original or Revision No. _____
PROGRAM CONTINUATION SHEET	AN AGENCY OF THE GOVERNMENT OF BRAZIL	3. Project/Activity Title Weed Control Research	
ANNEX			

(2) Fornecer uma secretária bilingue eficiente.

(2) Supply a competent bilingual secretary.

(3) Prover terras na Estação Sede do IPEAM, em Recife, ou outras em Estações Experimentais Regionais para manter experimentos de campo, conforme mútuo acordo. Além disso, prover assistência para assegurar a cooperação dos agricultores na pesquisa.

(3) Provide land at the Recife Research Station or other regional stations for mutually agreed upon field experiments. Additionally, provide assistance in securing farm cooperators for research.

(4) Prestar assistência no desenvolvimento e na aplicação de questionários de levantamentos das propriedades agrícolas.

(4) Provide assistance in the development and taking of farm survey questionnaires.

(5) Oferecer cooperação técnica, através de especialistas do Programa Especial de Pesquisa Agropecuária (PEPA), do DNPPA.

(5) Offer technical cooperation from specialists in related areas of agronomic research provided through the Special Program for Agricultural Research (PEPA) of DNPPA.

(6) Prestar assistência na obtenção de dados relativos a prejuízos causados pelas ervas daninhas, custo/benefício do controle das mesmas e a práticas de produção associadas.

(6) Provide assistance in securing data related to weed losses, cost/benefit of weed control and associated production practices.

(7) Prover escritórios, laboratórios e casas de vegetação.

(7) Provide office space, laboratory and greenhouse facilities.

For the Cooperating Government or Agency

For the Agency for International Development

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AID 138D-1A 2-701  <b>PHO AG</b>  CONTINUATION SHEET  ANNEX	<b>PROJECT AGREEMENT</b> BETWEEN AID AND <b>MINISTRY OF AGRICULTURE, CINCRA</b> SUBIN  AN AGENCY OF THE GOVERNMENT OF <b>BRAZIL</b>	1. Project/Activity No. <b>Contract AID/csd-1442</b>	PAGE <u>10</u> OF <u>10</u> PAGES
		2. Agreement No.	3. <input checked="" type="checkbox"/> Original or Revision No.
		3. Project/Activity Title  <b>Weed Control Research</b>	

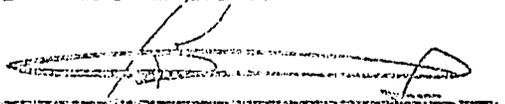
(8) Fornecer mão-de-obra conforma as necessidades dos experimentos no campo e nas casas de vegetação.

(9) Facilitar o acesso a computadores bem como assistência necessária.

(10) Proporcionar facilidades para publicações conjuntas, oriundas do projeto.

**VI. DURAÇÃO E VALIDADE**

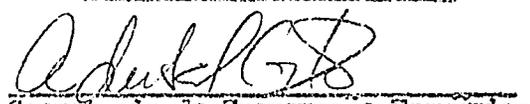
Este Convênio terá vigência a contar da data da última assinatura e terá duração até 15 de abril de 1975, a menos que venha a ser modificado por mútuo entendimento ou cancelado por uma das partes, em comunicação por escrito com 30 dias de antecedência daquela data do cancelamento.

  
 Ministério de Agricultura (M.A.)

Data: \_\_\_\_\_

  
 Coordenação de Assuntos Internacionais de Agricultura (CINARA)

Data: \_\_\_\_\_

  
 Secretaria de Cooperação Econômica e Técnica Internacional (SUBIN)

Data: \_\_\_\_\_

(8) Furnish labor as required for field and greenhouse experiments.

(9) Provide appropriate computer facilities and assistance.

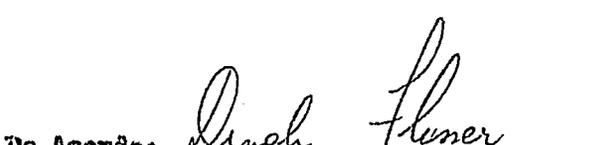
(10) Provide facilities for joint publications generated by the project.

**VI. DURATION AND VALIDITY**

The agreement will enter into force on the date of the last signature below and will remain in effect until April 15, 1975 unless modified by mutual agreement or cancelled by one of the parties, upon 30 days written notice, prior to that date.

  
 Agência Norte-Americana para o Desenvolvimento Internacional (USAID)

Date: \_\_\_\_\_

De Acordo:   
 Divisão de Cooperação Técnica (DCT) do Ministério das Relações Exteriores

For the Cooperating Government or Agency

For the Agency for International Development

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_  
 TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_  
 TITLE: \_\_\_\_\_

## PROJECT SUMMARY

Major Type of Activity: Key Problem Area - Developing LDC Research Capability

Project Title: Control of Weeds in LDCs

Contractor: Oregon State University

Contract Number: AID/csd-1442

Contractor Liaison Officer: Dr. William R. Furtick

Title: Director, International Plant Protection Center

Project Number: .931-17-130-463

Present: 73-3192704

Project Duration: Started 6/30/66 Termination Date 6/30/71

Budget:	a) Funds obligated through FY 69	:	\$686,878
	b) Funded for FY 70	:	326,630
	c) Funds requested for FY 71	:	350,000
	d) Estimated fund requirement FY 72:	:	400,000

TA/AGF Project Monitor: Mr. George D. Peterson, Jr.

Purpose: Weeds reduce crop production by competing with crops for available water, soil nutrients and sunlight, and by serving as hosts for important plant diseases, insect pests and plant parasite nematodes. Some of the new high-yielding varieties, in particular, require the strictest possible weed control in order to fully realize their production potential. The purpose of this project is to find simple, effective and economical methods of controlling weeds in the LDCs.

Description of Activity: With emphasis initially on Latin America, the contract is to (1) identify weed problems by species, extent, distribution, existing control methods, problems of control and economic importance and (2) evaluate, through on-site inspection, research institutions in designated countries to determine adequacy of facilities and research capability. The contractor's staff members are responsible for conducting the research and coordinating it through the A.I.D. country Missions, and for training local technicians in effective control methods and modern research procedures.

Accomplishments: The initial research indicated that 90% of production loss was due to damage caused by weeds during the first 3 to 4 weeks of crop life. On the basis of this information, an extension program was launched with the result that Colombia, which had made only token use of pre-emergence herbicides, increased sales of chemical weed control materials to over 50% of the total of such material purchased in all of Latin America. The successful Colombia program established a prototype capable of expansion to other Latin and Central American countries. Weed control programs are now under way in Ecuador, El Salvador and Panama, and several others are expected to initiate programs this year.

Research and assistance to date have increased crop productivity and reduced weed control costs. New materials are evaluated in Hawaii, at Oregon State and in the cooperating countries. Private enterprise has been stimulated to enter into weed control activities on farm lands, to contribute expertise, and to provide free-of-cost supplies of herbicides and weed control equipment for evaluation.

Future Plans: Extension and expansion of activities is anticipated in Central and Latin America; and expansion into East Asia for research on aquatic weeds is being explored.

TA/AGF: MSmith:7/15/70; revised 8/7/7

118.  
9310463 (E)  
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KPA 2-463  
RAC Meeting  
Nov. 8-9, 1972  
9310463 (9)  
PO-AL-777

PROJECT STATEMENT

Submitted: September 22, 1972  
Amended: October 4, 1972

A. PROJECT SUMMARY

35

1. Statistical

Project Title: Weed Control Systems for Representative Farms in Developing Countries

New or Extension: Extension - Four Years (see Note below)

Contractor: Oregon State University, Corvallis, 97331

Principal Investigator: A. E. Deutsch (Acting Project Director)

Duration: Current contract - July 1966 to December 1972  
Proposed extension - January 1973 to December 1976

Funding to Date: \$1,595,536 - Current contract to 12/31/72

Estimated Additional Cost: \$1,532,978 - Proposed extension to 12/31/76

Funding Required by CYs:	1973 -	\$350,427
	1974 -	371,452
	1975 -	393,737
	1976 -	417,362

Project Specialist: Willard H. Garman

Project Manager: Channing J. Fredrickson

2. Narrative

Project based on assumption that substantial reduction in crop losses due to weeds (30 to 40 percent yearly) must be effected before most developing nations can adequately improve their per capita supplies of low cost food.

Project designed to (1) develop new or adaptable combinations of economic weed control methods suitable for typical farms, and (2) develop concurrently micro data which can be used to assess the probable economic and social impacts of such weed control technology including implications for on-farm employment.

NOTE: Duration proposed by TA/AGR prior to RIGC review. At its meeting on September 28, however, RIGC recommended approval for three years, with a consequent reduction in cost to \$1,115,616. For additional detail, see final paragraph (page 19) of Section 11, Internal and External Reviews.

Close liaison will be maintained with the several international agricultural centers, and with other leading institutions and industrial organizations having outstanding research programs in weed science.

**B. EXPANDED NARRATIVE STATEMENT**

**1. Project Description and Background**

**a. Background**

Since mankind began organized growing of food crops, he has continually had to combat other plant life competing with his crops for available moisture, nutrients, sunlight and changing ecological conditions conducive to increasing attacks by plant diseases and insects. At present, lack of weed control reduces crop yields by 30 to 40 percent on the average and even may cause total crop losses.

For many centuries, the only methods of weed control were hand-weeding or simple mechanical devices such as the hoe. Progress in the fight against weeds accelerated during the last few hundred years through the development of cultivating equipment operated first by humans, then pulled by farm animals, and more recently tractors.

In the last century there has developed, at escalating rates, further understanding of the role in weed control of soil and water management systems, cropping sequences, new cultural practices and chemical techniques of weed control. These serve other ends such as moisture conservation, production diversification, insect and other pest control, and soil fertility conservation. To a degree, therefore, weed control by these methods shares costs with other derived benefits.

The impetus for change has resulted largely from shortages of manpower coupled with unsatisfactory results and increasing labor costs. The absolute levels and predictability of weed control by chemical methods proved generally higher than by hand or mechanical weeding or cultural practices, especially at the critical point when crop plants were just initiating growth. Use of the right chemicals resulted in substantial increases in crop yields, especially under conditions of inadequate total labor supplies for satisfactory weed control. Also, high investment in improved seeds, irrigation, and fertilizers encouraged growers not to risk losing a significant portion of their yields to weed competition. Consequently, herbicides have been widely adopted by growers of most crops in developed countries.

Modern systems of weed control fit well the requirements of large, commercialized farms in societies characterized by high labor costs, high educational levels, and abundant capital. Although these systems may transfer reasonably well to the non-typical large commercial farmers in certain of the developing countries, differences in climate and disparities in relative factor costs will introduce problems which likely will require further study in order to obtain least cost combinations.

Circumstances for which chemical systems of weed control appear best suited are quite different from those found in most developing

countries which it is A.I.D.'s policy and purpose to assist. New technologies must be developed for these countries; the question is, which types will fit their needs?

Modern mechanical weeders and herbicides systems might, for example, enable developing nations to: (1) increase food production most rapidly, (at least on larger farms), (2) release labor, now required for weeding, to produce other goods and services if there is a demand for such labor, (3) permit children engaged in weeding to attend school, (4) reduce the risk of weed-caused yield loss when labor shortages occur at critical weeding times or when long rainfall periods after planting cancel the possibility of hoeing and cultivating, and (5) perhaps produce more goods and crops for export to increase foreign exchange.

On the other hand, these considerations must be balanced against actual in-country economic and social considerations such as: (1) displaced labor that may result from adoption of chemical and mechanical "weeders"; (2) most smaller growers' lack of sufficient capital to purchase herbicides and power equipment resulting in a further production advantage to larger, better financed growers; (3) limited research and extension capability to evaluate new weed control techniques and to train the large number of smaller growers involved; (4) short- or long-term hazards to masses of people and/or the environment from herbicides; and (5) increased awareness of developing nations to consider various forms of intervention into the price, tax, land ownership and other alternatives that might encourage greater employment and more equitable income distribution from technical change.

This extended research proposal addresses itself to these problems, and by its design and execution should contribute to production increases. It is intended to bring about substantial progress against weed problems in a manner which helps solve, rather than exacerbate socio-economic problems.

#### b. Project Description

Research got underway in 1967 in Colombia and the highlands of Ecuador. Two years later programs were started in the five Central American countries of Guatemala, El Salvador, Honduras, Costa Rica and Nicaragua.

So far as possible the research and training phases have operated through existing institutions such as ICA (Colombian Institute of Agriculture), INIAP (National Institute of Agricultural Research) in Ecuador, and DGIEA (Directorate of Agricultural Research and Extension), El Salvador. Close coordination was and is maintained with all concerned A.I.D. Missions.

Building on secure foundations in Colombia, field research was expanded to contiguous regions in Ecuador, Panama, and five Central American states. Results soon showed crop yields could be doubled and costs of weed control reduced by 50 percent or more.

The OSU project procedure has been particularly effective in (1) strengthening local institutions, (2) encouraging leadership, and (3) promoting cooperative relationships in each country. Mainly, in-country results have been accomplished by training government institutions' staffs in modern weed control methods and then helping to develop research programs involving the personnel trained.

c. Progress Report

The following statement of progress gives detailed information on the program of work and its results in South and Central America. It also relates the magnitude of the project's overall information program.

Colombia

- 1) Over 1,000 experiments were carried out between 1967 and 1971, involving major programs at eight branch experiment stations in Colombia. These tests involved most of the commercial crops of Colombia, with emphasis on corn, sorghum, rice, small grains, potatoes, beans, sugarcane and citrus.
- 2) The project leader in Colombia acted as advisor to advanced students in weed control, at one time working with 19 students. These students made important research contributions in areas such as weed identification, weed vs. crop competition and studies on physiological action of herbicides.
- 3) Within four years, full-time Colombian personnel assigned to weed control research increased from five to nineteen. There were seven experiment stations with weed control programs in 1966; by 1970 there were 15.
- 4) At the request of A.I.D., the project leader in Colombia made three trips to Peru to assist in designing weed control research programs, especially for rice. The International Rice Research Institute also invited the project leader to the Philippines in 1970 to give a report on weed control research in rice.
- 5) Many weeds, even on government experiment stations, had not been identified or described in 1967. To fill this need, a weed identification book on cool climate weeds was prepared in both English and Spanish. Cost of the book is being covered by the chemical companies, local governments, the Rockefeller Foundation and the Regional Technical Assistance Center, Mexico City.

- 6) Project presence in Colombia was instrumental in supporting formation of a Colombian weed society (COMALFI). The same support has been accorded the recent organization of a Latin American Weed Society (ALAM). Earlier, project personnel had been prime movers in the establishment of the Asian-Pacific Weed Society which, in turn, has inspired an Indonesian and a Malaysian group.

#### Central America

The project, with headquarters in San Salvador, made considerable progress in just two years.

- 1) Field weed control trials were completed or were underway on over 20 crops plus additional research on pasture weeds and brush and aquatic weeds.
- 2) The number of experiment stations and full-time personnel working on weed control has increased as follows:

<u>Country</u>	<u>Stations</u>		<u>Personnel</u>	
	<u>pre-project</u>	<u>current</u>	<u>pre-project</u>	<u>current</u>
El Salvador	-	2	1/4	1
Costa Rica	-	3	1	1
Guatemala	-	2	-	1
Honduras	-	2	-	1
Nicaragua	-	4	-	1

- 3) Six student thesis problems are either being directly advised by the Regional Project Leader, or by project counterparts in the various countries.
- 4) Identification and description of important weeds was begun with a goal of publishing an identification manual in 1972.

#### Lowlands of Ecuador and Panama

Ecuador - During the one year since this project was established, the major accomplishments have been:

- 1) Working with the government organization, INIAP, 36 weed control experiments have been established in crops and pasture lands at five experiment stations.
- 2) Four research counterparts have been assigned to project work (vs. none on weed control previously).
- 3) A project to identify and describe the major weed species is underway and should be completed in 1972.

Panama - Approximately 20 research trials have been established at five locations. The program in Panama is being carried out cooperatively with the National University and the Ministry of Agriculture.

#### Hawaii\*

Two years ago the program in Hawaii was expanded to include research on rice, taro, tropical corn and sorghum, and pasture weed control. Much of the research done in Hawaii has been directly applicable to the program in Latin America.

Listed below is a summary of the work underway or completed in Hawaii:

- 1) Research on use of urea fertilizer as carrier for 2, 4-D for weed control in rice; resulting in publication in Proceedings of 3rd Asian-Pacific Weed Control Conference.
- 2) Advanced research based on early screening results with new herbicides for direct-seeded rice; resulting in publication in Proceedings of 3rd Asian-Pacific Weed Control Conference.
- 3) Seed pelleting as an approach to herbicide selectivity in direct-seed rice.
- 4) Research to index commercial herbicides for tropical and temperate pasture legumes and grasses.
- 5) Tropical sorghum and corn weed control problems, including weed control in ratoon sorghum production.
- 6) Weed control in taro grown under both paddy and upland conditions.

#### d. Goals of Proposed Program

Develop basic weed control and economic information for effective analysis and planning for agricultural development.

- 1) Evaluate economic losses from weeds and the cost/benefit of alternative methods and systems of control at the farm level for crops of major economic importance.
- 2) Develop sound methods of biological, chemical and cultural control of weeds either singly or in combination, integrated

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\* Note: The subcontract with the University of Hawaii has been terminated, in line with the recommendation of the Special Review Committee.

with other production inputs including seed, insect control, soil, water and crop management and fertilizers.

- 3) Evaluate weed control methods concentrating on the most efficient herbicides from the standpoint of cost effectiveness and ease of application. Consideration will be given to the factors of farm size, crops, seasons, availability of manual labor and regional variation within a country.

Promote the adoption of measures to insure safety in the use of herbicides and other pesticides in the developing countries.

- 1) Utilize the least hazardous herbicides suitable for each job.
- 2) Urge use of regulatory and monitoring procedures for safe residue levels and quality control.

Strengthen weed control capabilities in the developing countries.

- 1) Assist research and educational institutions in the developing countries to train weed control and extension specialists. Training will be specifically linked to allied or associated institutions.
- 2) Organize and conduct short course training in research methods.
- 3) Develop educational material suitable to the host country for weed control and safe applications methods.
- 4) Encourage key nationals with potential scientific leadership to pursue advanced training.

## 2. Significance to A.I.D. Objectives

Improved food production remains a major objective for A.I.D. and for most developing countries. Increasingly, the call is for improvement through research and implementation to yield socially acceptable technology beneficial to all sizes of farms and levels of managerial sophistication. Defined needs exist for programs that specify research objectives to develop economically optimum combinations of weed control techniques and systems for family-size farms, and assess the micro data for the probable economic and social impacts of such weed control technology, including implications for on-farm employment.

Because the new high-yielding crops require high soil fertility levels, to which weeds also respond, the significance of weed research

is of unparalleled importance and will continue so at least for the duration of this project. A carefully planned and conducted program of weed research, therefore, is necessary. Also, as the new inputs begin to be utilized by masses of smaller farmers, negative results could be very damaging to food production efforts in many localities.

Here are a few specific reasons why attention to weed control should not slacken:

a. Problems of unemployment and underemployment are becoming more pronounced in most developing nations. Objectives of the project now include: (1) a socio-economic input; and (2) integration of weed control systems into farm production systems, including best crop varieties, clean seed, insect control, water management and fertilization practices.

b. Problems of environmental protection and human and livestock health are also becoming of greater concern worldwide. All reasonable precautions need to be considered as land productivity is increased in the developing countries.

c. Weeds continue to cause annual crop losses of 30 to 40 percent in the majority of crops in most developing countries. Although excellent progress is being made, much more research and extension work are needed to minimize the severe losses, especially during the first three to five weeks after planting when most of the damage occurs.

d. Annual grasses of the genus Echinocha plague rice farmers and reduce yield in most tropical regions.

e. Various species of nutsedges proliferate in all tropical areas and represent a major constraint on crop production.

f. In many countries throughout the world poisonous weeds which are palatable to livestock take a heavy toll of cattle.

g. Aquatic weeds clog irrigation canals and drainage ditches, cutting efficiency by 50 to 90 percent. They hamper crop production, river navigation and fish production. Some, like water hyacinth and water lettuce, multiply so rapidly that they can jeopardize the operation of massive flood control and power development projects.

### 3. Relation to Existing Knowledge

The contractor, being one of the world's leading weed research centers, has the growing responsibility to keep abreast of all new knowledge in this field. There is every reason to believe this will

be done. Plans have already been made for periodic visits to the relevant international research centers. The contractor also will maintain and strengthen, if possible, his communication ties with key weed research personnel in the State Experiment Stations and the U.S. Department of Agriculture, and avail himself of current research information services available through the Science Information Exchange of the Smithsonian Institution, and the Research Information Service of USDA.

#### 4. Relation to Other Research

TAB's Office of Agriculture will assist the contractor in maintaining close ties with agricultural projects having socio-economic implications. In particular, it will be very important that working relationships be established and maintained with existing economic projects on (a) the impact of new technology on employment generation and income distribution (csd-2805, Cornell), and (b) sector analytical approaches toward estimating socio-economic implications (csd-2975, Michigan State).

Information generated in these projects will be a direct contribution by assisting in economic interpretation of data from the weed control experiments, and likewise the data from the weed experiments will be a valuable component of these and other of TAB's agricultural economic projects.

Crop output and efficient utilization of land are closely associated with how well weeds can be controlled and at what costs. A.I.D.'s research project on agronomic-economic research of tropical soils (csd-2806, North Carolina State University) will provide useful economic base-data for this project and at the same time will rely heavily on results from the weed program. Also, there will be a direct tie-in with A.I.D.'s project on soil fertility evaluation (1a-646, North Carolina State University) and with A.I.D.'s project on soil fertility requirements of the humid tropics (csd-2490, Cornell).

Close liaison is and will be maintained with the chemical manufacturers whose research programs are very important to the development of better, safer and more efficient herbicides. Although not a research project, activities under the University of California project on pest management (csd-3296) will be of direct concern to project personnel on the weed project, and vice versa.

Also, project personnel will develop and maintain close liaison with the international research centers. This will be of direct benefit to the project by preventing possible duplication of activities and providing for coordination of efforts directed at utilization of information. Close liaison with the State Experiment Stations will assure potential benefit from new knowledge developed by the stations at the earliest possible time. Many of these stations have developed considerable expertise in weed control methods and are turning out significant new results every year. Current screening of these results

may relieve Oregon State University of a certain amount of effort formerly carried out on campus.

## 5. Proposed Work Plan

### a. Scope of Work

Emphasis will be placed on: (1) development of information on mechanical, cultural and chemical methods for weed control and their relationship to production costs, yields and labor requirements, especially on typical family farms; (2) analysis of the data relative to costs-benefits; (3) development of optimum weed control programs based upon all factors including weed control techniques; (4) co-operation with other related economic projects involving sector analytical approaches toward estimating socio-economic implications and the impact of new technology on employment and income; (5) training counterparts in effective methods of weed control research; and (6) promotion of sound and safe usage of herbicides and other pesticides via training programs and direct encouragement of appropriate regulatory laws.

Weed control research programs will be planned jointly by an agricultural economist and weed control agronomist to ensure development of needed data. Emphasis will be on major food crops, including rice, wheat and maize, on both irrigated and unirrigated land, as local circumstances dictate.

In all cases, research programs will be carried out jointly with counterpart staff from host government agricultural research agencies. Based on previous experience, this is not expected to be a problem. Administrative support will be obtained from A.I.D. Missions where possible.

### b. Program of Work

#### In-Field

Posting of weed-control agronomists, selection of host country counterparts and initiation of field research programs should all occur during the first half of CY 1973, so that meaningful data collection should be underway during the latter half of the first year.

Host country assignments are proposed as follows:

1) Mr. Lupe Garcia - in El Salvador, with responsibility for Honduras and Guatemala. Mr. Garcia is already on assignment in El Salvador, with functioning counterparts in all three countries.

2) Mr. Myron Shenk - Costa Rica, with program responsibility for Nicaragua, Panama and Ecuador. Shenk who has just completed a

two-year assignment in Ecuador, is prepared to go to Costa Rica at an early date. Host country counterparts are already available from a previous weed control program.

3) Mr. Herbert Fisher - in Brazil, with additional responsibility for Paraguay. Mr. Fisher has had previous weed research experience in Brazil. He is fluent in Portuguese as well as Spanish and is prepared to move to Brazil immediately.

4) A competent agricultural economist, with Latin American experience and Spanish-language competence, has tentatively agreed to work full-time on this program as soon as it is initiated. He will be based at Corvallis, but will spend considerable time in the field.

#### On-Campus Support

The project will be directed jointly by the OSU Crop Science and Agricultural Economics Departments, with coordination by the Director of the Agricultural Experiment Station. Day-to-day operations will be handled by the project leader who will be the principal liaison with A.I.D.'s project manager.

In addition to in-field support travel in Latin America, appropriate personnel will maintain contact via correspondence and annual or biennial visits to major U.S. and worldwide research agencies, such as the USDA, the British Weed Research Organization, and the International Research Institutes. Some background research will be conducted at Corvallis, but the primary source of new information will be from other research agencies.

An information specialist at Corvallis will concentrate on publishing and disseminating useful knowledge on weed control, especially to A.I.D. Missions through the AID/Washington office. The information specialist will utilize the expertise of other on-campus staff to answer inquiries on weed control from A.I.D. Missions and government officials of developing countries.

An existing worldwide information gathering and dissemination system, organized to provide material to individual researchers in all developing countries, will be adapted to the new data output and expanded from the first USAID/OSU weed project.

In addition, the project will be ready to provide short-term weed control consultancy to any USAID Mission upon request. Such activity could be handled either as a GTS (General Technical Services) component or special ordering agreement. Arrangements would be sought for partial Mission funding as feasible.

The project, as structured in this proposal, could readily increase the number of in-field project regions, contingent on USAID

needs and A.I.D. directives. Sufficient positive potential for weed control research exists in numerous Asian and African nations. Additional regional projects would require more field personnel, but could be adequately supported by an essentially unchanged home-based staff.

### Proposed In-Field and Home-Based Staff and Functions

Initial project staffing is proposed as follows:

#### In-Field

1) Research agronomist - headquartered in Brazil, working with counterparts from: The Ministry of Agriculture, DNPEA (Department of Agricultural Research), and possibly the Ministry of Agriculture, Paraguay.

2) Research agronomist - headquartered in Costa Rica, working with counterparts from: The Ministry of Agriculture, Costa Rica; the Ministry of Agriculture and the National University, Panama; and the Ministry of Agriculture in Nicaragua.

3) Research agronomist - headquartered in El Salvador, working with counterparts from: The Directorate of Agricultural Research and Extension, El Salvador; Directorate of Research and Extension, Guatemala; and Rural Development, Honduras.

#### Home-Based (Corvallis)

- 1) Project leader - (2/3 time) - a weed control agronomist.
- 2) Research agronomist - for field and technical support.
- 3) Information specialist
- 4) Agricultural economist
- 5) Plus support staff, including:
  - a) One research technician in weed control.
  - b) One fiscal affairs specialist/translator.
  - c) Two secretaries.
  - d) Two graduate student research assistants (one each in agricultural economics and weed control)

#### Functions, Field Staff

Primary functions of the field-based staff will be:

1) Cooperate with the Corvallis-based agricultural economist in collecting and developing information on losses from weeds, costs of various weed control alternatives vs. yield benefits and labor requirements.

2) Work closely with counterparts, training them in weed control research techniques and developing information on effectiveness of various techniques for solving weed problems in major crops.

- 3) Concentrate research programs on developing optimum weed control programs for typical farm sizes and types in each country or area.
- 4) Assist host country governments in developing sound pesticide regulatory and safe-use programs.
- 5) Design weed control trials and evaluate cost/benefits of alternative weed control methods vs. other production factors, including crop varieties, water and fertilizer.
- 6) Join local government and educational institutions in weed control training for extension personnel by providing support for weed control information bulletin preparation, assisting in holding field days, and conducting weed control short courses in each country or major area. All Latin American-based field staff will be fluent in Spanish (or Portuguese in Brazil).

#### Functions, Home-Based Staff

Project Leader - Responsible for coordination of inputs from the OSU Crop Science and Agricultural Economics Departments' staff. Will have primary responsibility for planning of work, budget management, and for contacts with USAID and with national and international weed research organizations. Will cooperate with agronomist and economist in design of experiments and interpretation of data.

To benefit from information interchange with other research organizations and avoid duplication of effort, the project leader and/or the research agronomist or agricultural economist will periodically visit (generally every other year) FAO, British, Dutch, and Japanese weed research organizations, USDA and key state research agencies in the United States, as well as:

- CIMMYT, International Maize and Wheat Improvement Center, Mexico, D.F., Mexico;
- CIAT, International Center for Tropical Agriculture, Cali, Colombia;
- IITA, International Institute of Tropical Agriculture, Ibadan, Nigeria;
- IRRI, International Rice Research Institute, Los Banos, Philippines;
- ICRISAT, International Crop Research Institute for Semi-arid Tropics, Hyderabad, India;
- CIP, International Potato Center, La Molina, Lima, Peru;
- AVRDC, Asian Vegetable Research and Development Center, Taiwan.

Also, the project leader will be responsible for close liaison with industry and with the A.I.D./University of California project on pest management and related environmental protection.

The project leader will visit project staff in the field once or twice a year as he may deem desirable.

Research agronomist - In addition to helping the project leader to provide direct-in-field assistance and maintain liaison with other research agencies, the back-up research agronomist will have three primary functions:

- 1) Conduct research at Corvallis on new weed control products and practices and make this information available to project field staff and to developing countries worldwide.
- 2) Assist OSU in-field staff to design optimum test program for specific crops and weeds, as well as to answer inquiries from USAID Missions and developing country research personnel.
- 3) Secure, and arrange for supply of, required research equipment, reference literature, etc., to in-field staff.

Information specialist

- 1) Receive requests for information from OSU field staff, USAID Missions and developing countries, and handle directly or with assistance from the technical staff.
- 2) Maintain a list of the key weed control research, extension and teaching personnel of the world, especially in developing countries (approximately 3,000 people); periodically research, prepare and send a newsletter to them to provide information on weed control, new research developments, field trials and farmer experience provide outlet and channel for publication and exchange of weed control research carried out in other locations, as feasible and appropriate, including available literature.
- 3) Assume leadership for researching, editing, assembling and publishing additional books and/or literature on weed control which appear to fulfill needs in developing countries. A manual currently being considered will offer data on cultivation equipment and tools available worldwide for weed control, with emphasis on tools generally suiting the needs and budgets of small farmers. Also, a major function for 1973 will be continuing distribution of weed control literature recently completed and still in supply at OSU.

Agricultural economist - In close collaboration with the project leader, the research agronomists and field agronomists will have primary responsibility for design of the project to achieve its basic project purposes. Will work with staff weed control personnel

in Latin America and Corvallis in order to collect, analyze and evaluate data pertaining to the costs and benefits of present and possible new weed control practices. This will probably require one-fourth to one-third of his time in Latin America. Data will be organized and evaluated by such techniques as simulation, budgeting, and programming techniques.

Leadership of project design, involving joint effort by all project principals will be first claimant on agricultural economist's time. As first step, may run trial analyses of in-hand data for one or two countries where substantial relevant data are available from previous OSU project (csd-1442). Study will be phased to work out from a matrix involving one or two major food crops, one or two countries, and relatively few components of alternative weed control systems to larger matrix of variables as research and analysis experience indicates.

The economist will evaluate on-farm economic consequences of alternative approaches to weed control and will link with economists in other projects concerned with macro-micro systems for evaluating socio-economic options. Data will need to be collected and analyzed for the employment situation in each country or area and estimates made of the substitution relationships between labor and capital as weed control techniques are varied. This is a later stage objective of the project, and means will be sought to engage country nationals as fully as possible in this activity especially.

The economist must be fluent in Spanish and should preferably have prior experience in Latin America.

GES Component - While it may be desirable to confine the proposed research program to one area (Latin America) initially, research results - and other information services which the project can provide - will have applicability to many Asian and African areas as well.

Also, the staff and expertise level which would be required for this program could be profitably employed to serve developing countries worldwide for such items as weed control short courses, evaluation of weed problems, and designing of research programs relative to specific local weed problems and cropping conditions.

## 6. Research Methodology

The research methodology will involve mechanical, chemical and cultural processes of weed control. The economic research will focus on on-farm decision processes involving the estimating of elasticities of substitution, relevant factor price schedules and means for evaluating choices of techniques over size of farm, enterprise mixes, resource base, etc. The linkage of micro-macro elements towards evaluating options on multiple goals will involve developing linkages with other ongoing and proposed sector analytical efforts.

Field research will place more emphasis on combinations of cultural, mechanical and chemical methods and less on strictly chemical methods than in the past. They will be conducted to obtain precise physical and economic data and will follow standardized techniques as outlined in the Weed Research Manual, published by Oregon State University, January 1971, under this project.

#### 7. Research Competence

The International Crop Protection Center of Oregon State University is regarded as one of the world's leading weed research institutions. Key personnel have had broad experience in weed control and in working in developing countries. Good language capability will assist in carrying out the project objectives. Performance to date would tend to assure success for the extended project.

The laboratory and library facilities at Oregon State are fully adequate, and the university administration is committed to participating in international programs. Major cooperating university departments (crop science, biochemistry, soil science, agricultural economics) are rated as outstanding.

#### 8. Contribution to Institution Building

If strengthening of the weed control capability of developing nations is to be accelerated, continued attention must be given to training and institution building. The first five years of the project were quite successful in these respects. Activities to be carried out during the next four years will continue to place emphasis on training and building of local institutional research capabilities. Because of people already trained, and experience already gained, progress should be at a greater rate in the future.

#### 9. Utilization Plans

The Information Service Program will be continued. This includes a periodic Info-letter, publication and distribution of key reference materials on weed control research methods, weed control equipment, and latest information on safe and effective use of herbicides. Prompt servicing of information requests from developing nations and A.I.D. Missions will also be continued.

Thus far the project has been very successful in the area of personnel training, and in its efforts to build up capable counterparts and expertise in every possible local institution. Emphasis in this area will be continued. Effectiveness of seminars and workshops should be enhanced by virtue of this prior training.

Although utilization of results has been very encouraging, there is still a long way to go before reaching the small farmer with a meaningful program. It is here that a GTS component would be useful

because any successful effort would be so large that it would be considerably beyond the scope of a research project.

#### 10. Budget Analysis

The four-year budget, shown below, reflects the views of TA/AGR and the Contractor with respect to the continuation of essential functions at the levels projected therein. It allows for approximately a 5 percent annual rate of inflation. It provides for a full-time economist, or one-half man-year more than was recommended by the Special Review Committee.

Due to lack of funds it does not provide for a fourth field man (to cover additional countries in South America) as recommended by the Special Review Committee.

	Calendar Years				Total for 4 years
	1973	1974	1975	1976	
Salaries and Wages	\$152,482	\$161,631	\$171,329	\$181,609	\$ 667,051
Consultants	3,000	3,180	3,370	3,572	13,122
Payroll Assessments	18,298	19,396	20,560	21,794	80,048
Indirect Costs	72,322	76,661	81,260	86,136	316,379
Travel and Transportation	44,900	47,594	50,450	53,477	196,421
Allowances	11,300	11,978	12,696	13,458	49,432
Other Direct Costs	11,125	11,792	12,499	13,249	48,665
Equipment, Vehicles, Material & Supplies	37,000	39,220	41,573	44,067	161,860
<b>TOTAL</b>	<b>\$350,427</b>	<b>\$371,452</b>	<b>\$393,737</b>	<b>\$417,362</b>	<b>\$1,532,978</b>

NOTE: A detailed budget for the 12-month period, January-December, 1973 is attached (Appendix A)

#### 11. Internal and External Reviews

In advance of the May 15-16, 1972 meeting, the A.I.D. Research Advisory Committee (RAC) was furnished with a written summary of all prior reviews of the project. Excerpts from the record of that meeting, commencing with Dr. M. L. Peterson's field review of September 1970, are repeated here for convenience:

September 13-24, 1970 -- In depth Review by Dr. M. L. Peterson, RAC member: Progress toward objectives reported as excellent. Recommend continuation of project along similar lines for the next five years. Additional emphasis may be placed on development of chemical residue monitoring capability, residue standards and establishment of regulatory system. Training program working well and intimately tied with research.

December 8, 1970 -- Project Summary updated and evaluated by RIGC: Recommendation - Ample documentation exists to recommend extending the funding of the project through June 30, 1972. The future program of the weed control project should be reviewed with the Contractor.

January 28-29, 1971 -- 32nd RAC Meeting:  
Decision - Extension approved for one year with the understanding that a proposal for further extension or project modification to also include other institutions as may be appropriate, may be submitted to the RAC at a later date.

January 20-21, 1972 -- Comprehensive Review and Analysis of Project: Recommended modified goals as shown in review report. Complete copy is attached for information. Also recommended continuation for five additional years, focus and major thrust limited to Central and South America. Recommend that with loss of Dr. Juan Cardenas from Colombia, the position be filled and located in Central America. Recommend that a fourth field man be added to South America. Recommend additional funding to include 1/2 time agricultural economist, and centralize field training more and more into the Center for Tropical Agriculture at Palmyra, Colombia. Recommend that economic-socio aspects of weed control be extended into the field; that December 21, 1971 budget request of \$330,145 be modified:

Revised Budget of Dec. 21, 1971	\$330,145
Less \$15,000 for Hawaii Program	315,145
Plus \$45,000 for a 4th field man	360,145
Plus \$30,000 for socio-economic research	390,145

A copy of the full report is attached (Appendix B).

April 13, 1972 -- RIGC Action

After some discussion as to the level of economic input, the concern for coordination with the international agricultural institutes, and whether or not the summary reflected the intent of the special review committee, RIGC passed the following motions:

"That the project be funded through December 31, 1972, during which time the contractor will be required to

develop a time-phased project plan complete with specific research targets satisfactory to RIGC and RAC. The plan will take into account research under other sponsorship, particularly the International Centers. (Moved by Dr. Blume and seconded by Mr. Owens)."

Since that time considerable effort has gone into redesigning and restructuring the project. On July 25, 1972, Dr. Erven Long was at the OSU campus working with project personnel and administrative staff in outlining a revised research proposal. On September 11, Dr. G. B. Wood was in Washington for discussions of project plans with the TA/RUR and TA/AGR staffs.

The results of these recent discussions, as well as previous committee recommendations, have been most helpful to TA/AGR economists and agronomists in the preparation of this Project Statement.

September 28, 1972 - RIGC Action

Approval was recommended for three years with the proviso that a new work plan would be submitted to RIGC by July 1973.

12. Proposing Office General Evaluation

The Office of Agriculture is fully satisfied that substantial progress has been made under the ongoing project, despite the obstacles encountered in its early years.

However, because of the need to provide gainful employment of people, and the possible adverse effects of replacing masses of people by advanced machines and technology, TA/AGR endorses the Review Committee's recommendation that the project encompass socio-economic alternatives associated with improved weed control. Based on analysis of project operations, accomplishments and needs, TA/AGR strongly recommends that the project -- as now restructured -- be extended for the proposed four-year period.

The Office of Agriculture further recommends approval of the provision of technical services under the extended contract, or some other arrangement, to permit the extension of knowledge already available into Asia and Africa, and to enhance OSU's capability for adequate response to Country, Mission and Bureau requests for such services.



Omer J. Kelley, Director  
Office of Agriculture



Willard H. Garman  
Project Specialist

Appendix A

Budget Period 1/1/73 - 12/31/73 (12 months)

Additional details for Offeror's Analysis of Cost Proposal, Contract csd-1442

	<u>F.T.E.</u>	<u>Man-Months</u>	<u>Budget</u>	<u>Estimated Cost</u>
<b>I. Salaries</b>				
<b>A. U.S. Personnel</b>				
Home Office Professional				
Project Leader	.67	8	17,943	
Research Agronomist	1.00	12	12,013	
Informational Specialist	1.00	12	14,197	
Agricultural Economist	1.00	12	18,540	
Fiscal Affairs/Translator	1.00	12	9,326	
Graduate Research Asst (Ag Econ)	.50	6	4,635	
Graduate Research Asst (Weed Control)	.50	6	4,635	
	5.67	68	(81,289)	
Home Office Non-Professional				
Secretary	1.00	12	7,032	
Secretary	1.00	12	6,072	
Research Technician	1.00	12	8,772	
	3.00	36	(21,876)	
Total On-Campus-----				\$103,165
Field Staff Professional				
Research Agronomist, El Salvador	1.00	12	15,565	
Research Agronomist, Costa Rica	1.00	12	15,767	
Research Agronomist, Brazil	1.00	12	14,847	
	3.00	36	(46,179)	
Total U.S. Salaries-----				149,344
<b>B. Cooperating or Third Country Nationals</b>				
Field Staff Non-Professional				
Secretary, El Salvador	1.00	12	3,138	
			(3,138)	
Total Off-Campus Salaries-----				\$ 49,317
TOTAL SALARIES AND WAGES-----				\$152,482

	<u>Budget</u>	<u>Estimated Cost</u>
<b>II. Consultants</b>		
Pasture and Rangeland Vegetation Management; Aquatic Weed Control (approx 50 days at \$50)		3,000
<b>III. Fringe Benefits (Payroll Costs)</b>		
12% x 152,482		18,298
<b>IV. Overhead (Indirect Costs)</b>		
47.43% x 152,482		72,322
<b>V. Travel and Transportation</b>		
U.S. Travel (Personnel and Dependents)		
Fisher to Washington D.C. (orientation)	755	
International Travel (Personnel and Dependents)		
Fisher family to Brazil	1,650	
Shenk family to Costa Rica	800	
Four round trips to Latin America by Ag Economist	5,400	
Three round trips to Latin America by Weed Control and Administrative Staff	4,500	
One round trip to British Weed Conference (agronomist)	1,000	
Two round trips to Int'l. Weed Centers (leader & agronomist)	3,070	
In-field res. agronomists to Weed Science Society of America meeting	<u>2,000</u>	
Total International Travel-----		18,420
Other Personnel Travel		
Three round trips to Washington D.C. by project leader	1,575	
Local travel	1,000	
In-field Latin American travel	10,000	
Travel to other U.S. Weed Conferences, research stations, and field trips	<u>3,000</u>	
Total Other Travel-----		15,575
Transportation of Household Effects, Baggage and Vehicles		
Fisher	5,000	
Shenk	<u>4,500</u>	
Total Transportation of Household Effects, Baggage and Vehicles-----		9,500



II. Equipment, Vehicles, Materials and Supplies

Equipment (title retained in AID)

1 typewriter	500
1 calculator	500
3 AZ plot sprayers	1,500
1 camera	200
Slide projector w/accessories	200
Steel tapes	100
Planting and fertilizing equipment and equipment for truck	<u>750</u>

Total Equipment----- 3,750

Material and Supplies

Printed materials, seminar outlines, etc.	1,500
Miscellaneous laboratory supplies, including overseas needs	4,500
Postage and mailing	3,500
Film and developing	2,500
Reference books and journals	2,050
Stakes, fertilizer, sprayer parts, seeds and chemicals	3,300
Tires, replacement parts for trucks	1,500
Gas and oil	<u>4,700</u>

Total Material and Supplies----- 23,550

Vehicles

1 spray truck	5,000
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Freight

Shipping materials and supplies, equipment and seminar materials	4,700
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TOTAL EQUIPMENT, VEHICLES, MATERIALS AND SUPPLIES-----	37,000
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TOTAL ESTIMATED BUDGET-----	<u>350,427</u>
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**Weed Control in the Less Developed Countries**  
**Contract Number AID/csd 1442**  
**Oregon State University, Corvallis, Oregon**

**Report of a Comprehensive Review and Analysis**  
**January 20-21, 1972**

**Introduction**

A comprehensive review and analysis of the above project was requested by Omer J. Kelley, Director of the Office of Agriculture, Bureau for Technical Assistance. The review committee was composed of the following:

Dr. Francis J. Le Beau, Agency for International Development, Washington, D.C.

Dr. William B. Ennis, Jr, Branch Chief, Crop Protection Research Branch, Agricultural Research Service, U.S.D.A., Washington, D.C.

Dr. Maurice L. Peterson, Professor, Department of Agronomy, University of California, Davis, California; and Chairman of the Review Committee

The committee was charged with the responsibility of preparing a concise report of recommendations on (1) funding level, (2) actions to be taken, (3) parties responsible for each action, and (4) an analysis that explains and justifies the recommended actions. The committee was also requested to provide answers to questions raised in an Issues Paper.

The contractor, Oregon State University, was represented by Dr. Burton G. Wood, Director of the Oregon Agricultural Experiment Station, Dr. J. Richie Cowan, Head of the Crop Science Department, and Dr. Lyall F. Taylor, Acting Director of the International Plant Protection Center, Oregon State University.

Director Taylor presented a report of accomplishments of the weed project using slides to present data and to illustrate some of the research activities. Following the presentation, AID representatives of Research and University Relations, Office of Agriculture, Bureau of Technical Assistance, Regional Bureaus, and Office of Science and Technology commented on AID's goals, and problems and accomplishments of the project from their respective vantage points.

A departure from the published agenda was made by inviting the Oregon representative to sit with the review committee and answer questions and subsequently to develop a new set of goals and activities for their achievement. Our committee was very pleased with the open and free exchange of ideas, response to pointed questions, and helpfulness of the Oregon group. We are convinced that in this instance, the open review and analyses was a more

### Appraisal of Performance

The original contract set forth nine specific objectives of the project as follows:

1. Train local personnel in weed research and demonstration techniques.
2. Identify weed problems in the L.D.C's.
3. Test known methods for weed control effectiveness.
4. Develop new methods and techniques of weed control.
5. Determine the economic feasibility of control methods.
6. Increase weed research capabilities of local institutions.
7. Act as a source for technical information and available back-up for other AID Missions.
8. Evaluate new problems and changes occurring in agricultural technology.
9. Assist host countries to apply new weed control methods.

Our committee finds that significant and satisfactory progress has been made on most of these objectives. We also find that, while these objectives were appropriate when the project was initiated in 1966, changing conditions including progress made under the project, call for new objectives for the future. These are detailed later in the report.

Progress in training local personnel for weed control research probably represents the single most important contribution of the project. Exceptional skill in the recruitment of staff by the contractor to work overseas is a major factor in this success. All three fieldmen had Ph.D. degrees in some aspect of weed science, had previous experience in cross-cultural working relations, were fluent in Spanish, and were completely dedicated to the project. Cardenas in particular has unusual capability in teaching as well as in research.

Table 1 shows the number of full-time personnel assigned to weed control programs in the eight host countries when the project was initiated and near the close of the initial contract period, January, 1972. The training of 37 people for greater research and extension weed control activities is a very significant accomplishment.

**Table 1. Changes in Weed Control Research  
Full-time Personnel Assigned to Weed  
Control Research Programs**

Country	Prior to the Weed Control Project	Current (January, 1972)
Colombia	5	19
Ecuador	0	6
El Salvador	1/2	2
Panama	2	2
Costa Rica	1	3
Guatemala	0	3
Honduras	0	1
Nicaragua	0	1
Total	8 1/2	37

The individuals trained for weed control research and extension have remained in the field of their training to a far greater degree than usual for developing countries.

Table 2 shows that 25 research experiment stations have added weed control research projects since the beginning of the Oregon program in 1966.

**Table 2. Changes in Weed Control Research Projects in  
Experiment Stations with On-Going Weed  
Control Programs**

Country	Prior to the Weed Control Project	Current (January, 1972)
Colombia	7	15
Ecuador	3	5
El Salvador	0	2
Panama	3	5
Costa Rica	0	3
Guatemala	0	4
Honduras	0	2
Nicaragua	0	2
Total	13	38

Considerable time and effort was devoted near the start of the project to activities at home-base (Corvallis) and to the identification of weeds and weed problems in host countries. Numerous publications have provided host countries with a list of their important weeds, usually for the first time. Much less effort needs to be directed to identification of weeds in the future.

Some progress has been made on the economic effects of weed competition but we believe this aspect of the project needs strengthening as we detail later in the report. Table 3 shows an average loss of over 35 percent in

yields from seven major crops in Latin America. A comparison of hand weeding with the use of effective herbicides shows a 19.3 percent yield advantage from chemical control. Although these data are revealing concerning the costs of weeds, they do not consider the economic-social aspects of alternate solutions, including such considerations as labor and capital requirements.

Table 3. Weed Competition Effects on Crop Yields in Colombia

Crop	Average Yield Loss to Weeds	Yield Gains-Herbicides Over Hand Weeding
	%	%
Barley	19.2	15.6
Beans	51.1	24.1
Corn	45.6	21.3
Cotton	31.0	12.8
Potatoes	16.6	20.1
Rice	54.4	24.4
Wheat	28.7	16.9
Average	35.2	19.3

Obviously, research knowledge is only useful when readily available to users. A master list of publications indicates that an exceptionally fine job has been done in getting information disseminated. Nearly 50 publications were prepared at Corvallis from 1967 to 1971. Most of these were 15 to 20 pages in length and many were in both English and Spanish.

An information letter is issued periodically and distributed to over 2500 addresses. An herbicide use and nomenclature index was distributed to over 1700 addresses and a weed research manual to nearly this many. In summary, we find that the dissemination of information has been very well done.

#### Appraisal of Objectives

We believe that changes in objectives of the weed control project are needed because of changing AID goals, changing situations, and past accomplishments of the project. For example, employment now looms as a far more significant problem in the L.D.C's than may have been considered earlier. This raises important questions concerning the efficacy of rapid replacement of capital intensive technology for labor. Consideration must be given to problems created when hand labor is replaced by chemicals, and when purchases of equipment and chemicals must be made abroad. We are not suggesting that chemical weed control should not be pursued but that the social and economic consequences of doing so should be incorporated into the research objectives.

The committee is of the opinion that more emphasis in research should be placed on weed control practices other than chemical means. Preventive, cultural, biological, and combination methods should be researched.

The entire problem of environmental safety receives very little attention in Latin America. Because of this, chemical companies often investigate and introduce new chemicals into Latin America before they do in the states where rigid safety measures are required.

Weed control is only one of many cultural practices required in crop production. The introduction of improved and higher yielding varieties, use of higher quantities of fertilizer, expansion of irrigation, all are factors that interact with weed control practices. We believe the research in the future should give greater attention to weed control as a link in the production system.

An important early objective of the project was to identify important weeds and weed problems. Much has been accomplished and although some effort must always be given to this, it need not be a major objective in the future.

Finally, the heavy reliance on back-up knowledge from Corvallis seems less necessary in the future if the project will use other weed research programs to provide this knowledge. The U.S.D.A., essentially all State Experiment Stations, and the International Research Centers all have weed control research in progress. Consequently, if this knowledge is tapped and used more effectively, some resources at Corvallis for back-up knowledge can be shifted to the field.

### New Goals

The new goals which follow were developed in joint session between the review committee, AID representatives and the three representatives from Oregon. All agreed that these goals and the activities set forth for achieving them, are more relevant of future problems in so far as they can be projected for the next five years. Director Wood, Dr. Cowan, and Dr. Taylor all agreed that these were goals for which they had full sympathy, and they were within the technical competence of the Oregon station.

### Goals

1. Characterize the economic, biological, and social problems of weed control in the L.D.C's.
2. Develop weed control knowledge that contributes to effective analysis and planning for agricultural development.
3. Promote the adoption of measures to insure safety in the use of herbicides and other pesticides in the L.D.C's.
4. Integrate new and present weed control technology into production systems.
5. Strengthen weed control capabilities of the L.D.C's.

The general thrust of the new goals is to broaden the approach to the weed problem from a narrow focus on technology to weed control as an important tool in social and economic development. The new research will include consideration of the consequences of alternative approaches to the weed problem.

Below are listed the research activities anticipated to be undertaken to achieve these goals.

#### Goal No. 1

Characterize the economic, biological and social problems of weed control in the L.D.C's.

##### Activities

- A. Evaluate economic losses from weeds and the cost and benefits of alternative methods and systems of control at the farm level.
- B. Evaluate the social-economic consequences of alternative approaches to weed control, including effects on income distribution and employment.

#### Goal No. 2

Develop basic weed control knowledge that contributes to effective analysis and planning for agricultural development.

##### Activities

- A. Develop methods of biological and cultural control of weeds.
- B. Develop methods of chemical control of weeds.
- C. Develop preventive weed control methods.
- D. Develop combination methods of weed control.

#### Goal No. 3

Promote the adoption of measures to insure safety in the use of herbicides and other pesticides in the L.D.C's.

##### Activities

- A. Develop information to improve environmental safety in the L.D.C's.
- B. Develop information for safe handling and use of pesticides, e.g. develop new kinds of protective clothing for the tropics.
- C. Assemble information for, and encourage the adoption of labeling and other regulatory procedures for effective and safe use of pesticides.

Goal No. 4

Integrate new and present weed control technology into production systems.

Activities

- A. Evaluate the interactions of various production practices with weed control such as:
  - 1. Crop varieties
  - 2. Fertilizer kinds and rates
  - 3. Other pest control practices
  - 4. Irrigation
  - 5. Other production practices
- B. Relate weed control to farm characteristics (size, capitol, labor, etc.)

Goal No. 5

Strengthen the weed control capabilities of the L.D.C's.

Activities

- A. Assist research and educational institutions in the L.D.C's to train weed control research and extension specialists.
- B. Design and develop educational materials on weed control and pesticide safety.
- C. Design and conduct short course training in the L.D.C's.
- D. Use consultant specialists to assist in--country training.
- E. Encourage key nationals having potential scientific leadership to pursue advanced graduate training.

Recommended Operational Changes

Shifts in operations will be needed to attain the goals detailed above. These have been considered by the contractor and he agrees that these changes can be made within the time and financial framework set forth in the specific recommendations in the section which follows.

Staffing at field level would become a higher proportion of the total effort, to be accomplished in part by some reduction in home-based back-up services. Greater reliance in the future will be given to support data attained from other research centers engaged in weed research. The sub-contract with the University of Hawaii would be discontinued.

Economic and social aspects of the weed control problem will become part of a coordinated program utilizing staff inputs from additional

departments at Corvallis, or if needed short-term specialists from other research agencies.

Additional staffing in Central America will correct a heavy over-load situation for one field man serving five countries. The Colombian program will be phased out except for periodic visits by specialists. Programs in Colombia over these past five years leaves this country well prepared to carry the weed control program with very little outside assistance.

Some expansion of program activities in South America will be possible by the assigning of an additional field man to this region. Cooperation with a weed control program at CIAT will permit some shift of the training load to the International Center and the released time can be utilized to extend the research component of the program. Contacts will be made with Turrialba to determine if and how this location and organization might serve the interests of the Weed Control project.

The above comments have been stated in terms of specific changes which will occur, assuming contribution of the project and approval of the recommended funding. This was possible because the responsible administrators of the project at Corvallis sat with the committee during these considerations and were enthusiastically agreeable to the changes.

#### Specific Recommendations

The following specific recommendations are those of the three-man review committee. However, we believe they meet most of the important questions raised by the AID specialists during the discussion of the project, as well as the interests and capability of the contractor.

1. We strongly recommend continuation of a weed control research program with Oregon State University for an additional 5-year period, organized along the lines of previously stated goals.
2. We recommend that the focus and major thrust during this period be limited to Central and South America except for the practical application of new knowledge and approaches which might be applied elsewhere and by others with limited assistance from the Oregon project.
3. We recommend that the staff vacancy created by the anticipated loss of Dr. Juan Cardenas to the program be replaced and located in Central America at a location to be determined by the contractor after visits to these countries, including a visit to Turrialba.
4. We recommend that an additional field man (the fourth) be added to the staff to service additional South American countries, possibly located in Peru but to work in several countries probably including Brazil and Uruguay.

5. We recommend that the sub-contract in the amount of \$15,000 with the University of Hawaii be discontinued and that these resources be utilized to expand the field program in Latin America.
6. We recommend that in the event that the program in Ecuador ceases to be feasible, this program be transferred to Panama and that the released time of this specialist be used to initiate a modest program on aquatic weeds which in turn might be extended to other countries.
7. We recommend additional funding above the revised budget of Dec. 21, 1971 for purposes of providing at least a half-time specialist in agricultural economics plus other short-term specialists as may be needed) to carry out the expanded goals as outlined above.
8. We recommend continuation of the informational program as an effective method of putting new weed control knowledge in readily useable form for the host countries.
9. We recommend that the contractor explore the possibility of shifting some of the responsibility for training of weed control specialists in Latin America to Dr. Jerry Doll, now located at the Center for Tropical Agriculture, at Palmyra, Colombia.
10. We recommend that the contractor investigate the possibility of developing cooperative relations with Turrialba for (1) studies on economic and social aspects of weed control and (2) a site for research and training for Central America.
11. We recommend that the contractor rely more heavily than in the past on back-up information from other weed research centers than Corvallis. We specifically call attention to important research on weeds in rice conducted at three of the international research centers (IRRI, CIAT, and IITA) and at the University of California at Davis, Stuttgart, Arkansas, Beaumont, Texas and Crawley, Louisiana. Weed research information is also being developed at nearly all of the State Agricultural Experiment Stations and at many locations by the Agricultural Research Service, U.S.D.A. We call attention to the CRIS (Current Research Information System) method of obtaining up-to-date print outs of all weed research in progress in the United States. This information can be obtained through the office of the Director of the Experiment Station at Corvallis. We believe that this approach will not only tap sources of new weed control knowledge not presently used but will eliminate the need for the Hawaiian program as previously mentioned, and possibly reduce the necessity for some of the Oregon based back-up research.
12. We recommend that some additional funding be requested to cover the expanded field program recommended above and extension into the economic-social aspects of weed control. We suggest that the December 21, 1971 budget request of \$330,145.00 be modified as follows:

Revised budget of Dec. 21, 1971	\$330,145.00
Less \$15,000 for the Hawaii program	315,145.00
Plus \$45,000 for a 4th field man	360,145.00
Plus \$30,000 for economic-social research	390,145.00

13. We recommend approval of these above recommendations by the Research and Institutional Grants Council of AID and a revision of the Project Plan by the Contractor to reflect these recommendations.

Dr. Brady stated that the RAC is interested in the total program of AID research. In conclusion he requested Dr. Kelley to provide to all RAC members copies of the slides shown.

## Project Review

### Agriculture

#### 1. Control of Weeds in the LDCs - Oregon State University

Dr. M. Peterson reported for the subcommittee consisting of Drs. Ruttan, Whitney, Kramer, and Adams. He discussed the initial project objectives and the numerous reviews since the inception of the project. He complimented the contractor on his achievements, especially in training of local participants and in the field research conducted in several L.A. countries. Following this, Dr. M. Peterson discussed the results of the last intensive review team, which recommended major shifts in project objectives. Dr. M. Peterson observed that he had received a copy of the project proposal only last night. It was therefore, difficult for the subcommittee to review the project. At this point, Drs. Brady, Adams, Anderson and Hagen indicated that there is some confusion pertaining to desired action on the project. Dr. Brady felt that Dr. McDermott might want to clarify the situation. Dr. McDermott explained that RIGC and TA/RUR felt that the project statement and work plan as submitted to RIGC for review did not adequately reflect the suggestions of the intensive review committee. Dr. McDermott said that RAC is being asked to act only on the requested 6 month extension of the project to allow TA/AGR and Oregon State University the time necessary to restructure the project to comply with the review committee's recommendations. Dr. M. Peterson felt that information indicating that the project will be continued in its improved form beyond December 31, 1972, should be conveyed to Oregon State University. Dr. M. Peterson informed RAC that Dr. Whitney is in favor of the project. Dr. Anderson suggested that, for procedural reasons RAC should consider withdrawing the project from the agenda. However, Dr. Brady stated that the 6 months extension is needed now because the project will expire before RAC could act on the improved proposal to be submitted at a later date.

To questions by RAC members regarding environmental impact of this project and how the \$165,000 will be utilized, Dr. Garmen explained that details of time phasing will be worked out within the frame of the revised project proposal. The proper monitoring of environmental effects will require more people and equipment, and thus will not be a major part of efforts here but a GTS project with the University of California will function in this capacity for AID.

Dr. Montgomery felt that a policy review is needed to address both social and economic changes in highly technical research, such as this. He felt that such a system should be introduced. But this raises the

question of whether or not RAC should introduce into the project activity of legitimate issues which the contractor fails to address he said. Dr. Brady suggested that the issue should be discussed at the next RAC meeting. Dr. Montgomery suggested an amendment to the motion which would require additional AID resources in order to create the opportunity of introducing the recommended changes in the project. After a brief discussion that followed, Dr. Ruttan introduced a motion.

Motion: RAC recommends approval of 6 months extension of the project as proposed in the document to allow time for restructuring of the project proposal by AID and Oregon State University staff.

Dr. Hagen requested and received affirmation that a copy of the "legislative history" will be supplied to the contractor.

Motion: (Moved by Ruttan, seconded by Schweigert)  
Vote: Unanimous

Further discussion developed regarding the social economic interface. Dr. D. Peterson felt that the project would not be able to deal with this system, because this would result in a fragmentation of the technical program. Dr. Ruttan on the other hand, believed that Oregon State University should consider the full range of weed control techniques and all the problems associated with it such as economic analysis and developmental techniques at farm and perhaps even higher level. For example, this project should produce information on what happens to herbicides in soils and crops. Dr. Anderson, cautioned that if broad social implications are to be a significant part of the project, than the program would become impossible to develop technically. Dr. Hagen agreed with Dr. Ruttan's statement. He then added that the main objectives of this project should not be solely to destroy weeds but to find alternative control methods as well.

### Progress Report

#### Adapting and Testing of Agricultural Stimulation Model to Sector Analysis - Michigan State University

Dr. Ruttan reported for the RAC subcommittee. He recounted the earlier (4/15/71) RAC decision to recommend limited initial approval, of the proposal with full approval of the project when at least one AID Mission and LDC would cooperate in a full test of the simulation model, and when the RAC subcommittee upon site visit is favorably inclined to the project. A site review was held on May 5, 1972 at East Lansing and the RAC subcommittee was in favor of supporting this project. Dr.

KPA 2: 463  
RAC Meeting  
Jan. 28-29, 1971  
9310463 (10)  
70-ACC 477

PROJECT SUMMARY

Project Title: Development of Weed Control in Less Developed Countries (Contract AID/csd-1442)

Contractor: Oregon State University (OSU)

Principal Investigator: William R. Furtick  
Director, Plant Protection Center  
Oregon State University

Duration:

RAC Currently Authorized Period: July 1, 1966 - June 30, 1971

Proposed Extension Period: July 1, 1971 - June 30, 1972

Estimated Costs:

Previously Approved Total Project Funding Thru FY 70: \$1,013,509

Funding Required (By Fiscal Year): FY 1971 405,000

Project Manager:

George D. Peterson, Jr., TA/AGF

## Project Narrative

### 1. Background

This project was approved by the RAC at the March 31 - April 1, 1966 meeting and was recommended for A.I.D. support. The project was assigned an initial duration of five years. The first phase of the project was to evaluate weed problems in the four A.I.D. regions, starting with Latin America.

During the first year, four countries -- Colombia, Peru, Argentina and El Salvador -- were selected to be headquarters for regional weed control projects and arrangements were concluded with the Missions and local governments of each country. Four staff were hired and trained as project leaders. Of the four, only Dr. Juan Cardenas reached his post in Colombia prior to the freeze on new assignments imposed by the BALPA ceilings. The other staff, after extended delays, were assigned to weed control positions under Oregon State University contracts with the A.I.D. Missions in Turkey and Jordan.

As soon as the BALPA ceilings were modified, the project renewed efforts to hire weed control specialists for assignment in Latin America. In October 1969, Guadalupe Garcia was posted in El Salvador to cover Central America. Myron Schenk was assigned to Guayaquil, Ecuador in May 1970 to cover the lowlands of Ecuador and Panama.

On the basis of expressed interest of Asian-country Missions in weed control, a field review of the Asian countries was made in 1969. Prevalent weed problems, existing facilities and professional staff available for collaborative projects were reviewed with the Missions in

the Philippines, South Vietnam, Thailand and Malaysia. A recommendation was made to A.I.D. to establish a three-man regional research and technical assistance center in Southeast Asia under the current contract.

## 2. Activity Focus of the Project

a. In general terms the project's central objective is to increase the food production in the LDC's through application of weed control technology and practices.

The specific objectives are to:

(1) Identify the nature of the weed problems in the important crops of each area or region.

(2) Test known methods of weed control for effectiveness and suitability for specific areas, regions or countries.

(3) Increase the weed control research capabilities of local institutions through training of local personnel.

(4) Assist host countries in applying appropriate new weed control methods.

(5) Develop new methods and techniques of weed control.

b. These objectives are being applied via three procedures:

(1) In-field applied research, extension and teaching programs in the host countries.

(2) Research on new products and practices at OSU and the University of Hawaii.

(3) An informational service at Oregon State University to provide needed backup information on technology.

### 3. Progress and Results

Specific activities on research, institution-building and extension programs include:

- a. Results of the applied research are put into practical use by preparing weed control recommendations for specific crops.
- b. Improving the effectiveness of the extension programs to transmit the latest technology to growers.
- c. Field days to demonstrate weed control techniques to growers, government and industry personnel.
- d. Short courses to teach fundamentals of weed control to growers, industry and government personnel have been held in Colombia and Ecuador.
- e. Impetus was given to establishing a professional weed control society in Colombia to provide a framework for pooling and sharing useful information.
- f. The importance of gearing weed control to economic conditions and benefits has received attention. Studies have been run of various chemical, mechanical and cultural weed control methods under local conditions, considering local labor availability, cost, returns to the grower, etc.
- g. The first step in attacking the problem is to identify the economically-important weed species. The project has devoted a significant share of attention to preparation of literature on local weed identification.

h. International and local industries have been encouraged to increase activities in Colombia and other countries to improve supply and service of chemicals, equipment and other products.

i. A variety of manuals, handbooks, and technical reports have either been issued, are in manuscript form, or are currently in process of publication:

Two new manuscripts have just been prepared and issued. Herbicide Use and Nomenclature Index. This work lists commercially available herbicides for the important food and fiber crops of the world along with a section on the chemical terminology and various worldwide trade names of the herbicides.

Weed Research Methods Manual for Establishing New Programs is a comprehensive effort covering all aspects of weed control research activity from the "how to" of plot layout to the importance of coordinating programs with governmental agencies and private individual cooperators.

Material is currently being collected to publish the Agricultural Equipment Manual for Small Farms and Experimental Work. The publication will list world sources of small equipment (initially weed control related units such as sprayers, booms, and nozzles) of particular usefulness to personnel attempting to procure the necessary basics for weed control work.

j. The information service section also sends articles of technology on the importance of weed control to international and host country periodicals. For example, information published by OSU and the Institute of Colombian Agriculture (ICA) is representative of technical data on toxicity and safe usage of herbicides. And a Turkish graduate student at OSU had gathered important data relative to present levels and future needs of weed control in his home country. The material was published by the project as Weed Problems of Turkey.

k. New Products and Practices Research

This segment of the project is carried out primarily at Oregon State University and at the University of Hawaii, in order to include research on both temperate and tropical zone crops and weed problems. It includes initial testing of new herbicides, application equipment, combinations of herbicides with fertilizers, and other practices helpful to solving weed problems in less developed countries, as well as studying important environmental relationships, such as persistence of chemicals in the soil after application. In most cases, the staff and capabilities of less developed countries are still too limited to effectively perform herbicide screening work.

1. "Leads" developed through product testing, such as new applications of herbicides, are passed on to project staff as well as to other countries for guidance in establishing useful tests and demonstrations. A recent product evaluation report was issued on the herbicide amiben tested under tropical conditions. This study grew out of the situation where a large quantity of the herbicide was given to A.I.D. for use in less developed countries. A need developed to ascertain other possible uses of the material than what was currently known. The project trials testing work led to the discovery of amiben's potential usefulness as a herbicide on rice.

At issue are questions of design and focus concentration of the weed control practice research, and the question of at what point, and with what type of analysis should economics be incorporated into the project.

#### 4. Future Dimensions of the Project

The OSU program can be extended specifically, or generally, to other A.I.D. regions. For example, on aquatic weeds in Southeast Asia, or on rice and pasture weeds in Africa.

The basic format developed in Colombia for accomplishing the project objectives has generally proven to be effective. Evidence indicates a similar procedure could be readily extended to other countries and regions. The OSU project procedure is particularly effective in three areas: developing effective local institutions, encouraging leadership, and promoting cooperative relationships in each country. Mainly, in-country results have been accomplished by training local government research institution staffs in modern weed control methods and then helping to develop effective research programs involving the personnel trained.

With regard to future plans, there are several operational areas that can be improved and strengthened:

##### a. Identify and Train Leaders

Identify, at the earliest possible date, a greater number of individuals capable of assuming a national leadership role in weed control programs in their country. Also identify those interested and capable of advanced academic and research training at a U.S. institution.

##### b. A Need for Inter-Project Cooperation

Weed control is an essential part of the production package necessary for improved agricultural production. Because losses caused by weeds are less apparent than direct damages caused by insects, diseases

and other pests, greater effort must be devoted to developing close working relationships with other agricultural projects on soil fertility, plant breeding, entomology, etc. Additional data is needed to show the relative importance of adequate weed control for maximizing production in conjunction with improved varieties, fertilizer and control of other pests.

c. Improved Coordination

Closer liaison is needed between the central research staff (working with the world industries and organizations) and the regional project leaders. To accomplish this, it is proposed that Oregon maintain first-hand contact with each regional leader at least twice per year, plus closer contact with industry.

The new product evaluation program at OSU and Hawaii needs to be more efficiently coordinated and aimed to give maximum, prompt guidance to the regional program leaders.

d. Solving Problems from the Field

An effort should be made to expedite information from the field on current and anticipated problems so that central staff may devote increased effort to providing consultation and solutions.

e. Electronic Data Processing

The EDP program developed by the project has potential for providing rapid answers to complicated or time-consuming problems related to weed control research. Substantial liaison work will be required to insure that the system operates efficiently and makes possible the immediate utilization of the large volume of data being generated by the project.

f. Technical Information

A rapid increase in awareness of the AID/OSU project by missions and research personnel is causing a growing demand for technical information. Additional effort will be required by the information services group to meet this demand. Increased support is needed to carry through an extensive publications program launched by the project and designed to provide researchers and workers in LDC's with highly practical and useful information.

g. Weed Control, Education and Population Control

Concern is frequently expressed that mechanization of agriculture (including the labor-intensive operation of weed control in traditional agricultural societies) may cause extensive labor displacement; hence, efforts should be made to integrate any studies of problems associated with mechanization. Because hand weeding often involves women and children, attention should be given to the relationship of farm labor needs to any rural education and population control studies.

h. The Need for Economic Data

In order to adequately assess the usefulness and potential impact of improved weed control technology, economic data and economic analysis to evaluate program results and effects are needed. Problem magnitude, losses caused, and the cost/benefits of alternative measures should be included. These will, of necessity, require evaluation of available and alternative use of labor as a factor in establishing the feasibility of using less labor consuming methods. (Improved weed control does not mean substitution of equipment or chemicals for labor. More timely use of labor could have a major impact on agricultural productivity.)

The research must have design consistency with regard to economic analysis objectives: labor substitution, employment, crop diversification, income generation, and capital formation. Indirect costs and benefits with regard to the family unit and the environment should be considered.

1. New Products and Practices Research

While the applied research yields costs-returns type economic analysis data, a component of the research should also obtain input-output data relative to production function analysis. Whether at this stage or whether it can be a focus of this project as constituted, are the economic issues of estimates of substitution relationships on crop yield and labor requirement for chemical, biological, and cultural practices. The research has mainly concentrated upon herbicides. However, considering the questions about herbicides being asked, and considering the economics of weed control, it is timely to re-evaluate the priority questions the research should concentrate upon (also see sections b, c, g, and h above).

5. Evaluation

The Oregon State University weed control staff is well recognized internationally for its competence, quality and strength. Its competence has been further enhanced by the cooperative relationship developed with the University of Hawaii. The staffs of the two Universities represent one of the largest and one of the best known sources of competency on the biophysical aspects of weed control. This competency is backed up by a strong graduate student training program, particularly at Oregon State where about 20 percent of the weed control graduate students in the U.S. are enrolled.

Though Oregon State University project actually has had less than three years to demonstrate the importance of weed control in increasing agricultural productivity in the LDC's, and the conceptual soundness of its method of operation, results obtained have been problem focused, and the direction of the project has been constructively positive. In this regard the project started out on the basis of reasoned hypothesis, rather than specific objectives, the true objective being developed on a factual basis established by country specific survey. The first survey was conducted in Latin America. This survey established that plant protection was limited and few trained people were available. Therefore, project objectives were formulated in keeping with these facts. The objectives formulated a research-technical assistance component and applied component on training, communications, and institution-building.

Following formulation of the Latin America phase of the project, preliminary surveys were made in South East Asia and NESAs, and coordination was developed with FAO plant protection projects. However, at the outset, the weed project was affected by BALPA. In fact, field staff were in transit to field locations when the BALPA personnel ceiling went into effect and were notified to return to Corvallis. As a result of BALPA, the field staff originally proposed was cut by some 50 percent. The USAID programs also changed to accommodate reduced funds and staff, and the weed control program had to be adjusted in accordance with these changes.

Accordingly, the research and applied work had to be rearranged. Under the rearranged project, much of the basic research is being done at Corvallis and at a sub-station developed in cooperation with the University of Hawaii. The country end of the project was further adjusted to accommodate the country requirements on training and applied control.

To have as broad a dimension and as wide an applicability as possible, Oregon State University has established an International Plant Protection Center at Corvallis to integrate research and graduate and undergraduate training on weed control.

#### 6. Recommendation

Ample documentation exists to recommend extending the funding of the project through June 30, 1972. The future program of the weed control project should be reviewed with the Contractor at the earliest covering points in paragraph 4, a through i, with particular emphasis on h and i.

Dictated by Phone 10/20/70  
Dr. M.L. Peterson (RAC Member)  
University of California

DEVELOPMENT OF WEED CONTROL IN LDC's  
Contract AID/csd-1442

The research program on development of weed control for LDC's was reviewed in depth through a visit to Colombia, Ecuador and El Salvador, September 13 to 24, 1970. A detailed report is in the process of preparation. This is a brief summary of my conclusions.

Progress toward the stated objectives of the project have been excellent and I strongly recommend continuation of the project along the present lines for another five years. Major improvements are being made in finding practical answers to staggering problems with weeds and in developing research capability within cooperating countries. The research program and the prestige of the project leader in Colombia have served as a checkrein on chemical companies which operated with little or no restraints in the past. The companies are more careful in their recommendations and promotion activities than they were and great improvements have been made in the cooperative relations and attitudes.

It is recommended that additional emphasis in the next five years be placed on development of chemical residue monitoring capability, residue standards, and in establishing regulatory systems. Improvements in economic evaluation of weed control methods can and should be made within another year when essential basic data become available. Another weed control specialist is needed in Central America to share the workload of the present specialist who is attempting to service five countries. Sub-contractual arrangements should be explored with the California Station to provide the home-based backup information on rice weed control. The program should aim to leave two main centers for rice research and training in Latin America by the conclusion of the next five year period. The program in Bogota is already serving that purpose for South America. Costa Rica is suggested as the location for a similar center for Central America. An additional specialist at that location will be required to meet this objective.

The training programs are intimately tied in with the research and all trainees are required to plan, carry out, and report on weed control studies. The trainees have made it possible to expand the research base very effectively. The system is working very well.

BUDGET SUMMARY  
Oregon State University  
FY 1971

	<u>1971-72</u>
<u>SALARIES AND WAGES</u>	
Administration	\$ 61,620
Oregon Backup Research	39,014
Information Services	44,976
Latin American Staff	<u>52,687</u>
SUBTOTAL	\$198,297
<u>PAYROLL ASSESSMENTS (12%)</u>	23,795
<u>INDIRECT COSTS:</u>	
On-campus (45%)	65,524
Off-campus (25%)	13,172
<u>TRAVEL AND ALLOWANCES</u>	41,800
<u>EQUIPMENT</u>	5,000
<u>HAWAII SUBCONTRACT</u>	15,000
<u>OTHER DIRECT COSTS</u>	<u>41,500</u>
<u>TOTAL</u>	<u>\$404,088</u>

RAC  
1/16/76  
463(2)  
9310403 (11)  
20-AAA-777  
380

PROJECT STATEMENT

Submitted:

1. Project Summary

A. Statistical

Project Title: Weed Control Systems for Representative Farms in Developing Countries - AID/CM/ta-C-73-23

New or Extension: Extension - 3 years

Contractor: International Plant Protection Center (IPPC), Oregon State University, Corvallis, Oregon 97331

Principal Investigator: Stanley F. Miller, IPPC Director

Duration: Current Contract - January 1973 to December 31, 1975

Proposed Contract - April 1, 1976 to March 31, 1979

Funding to Date: \$2,518,320 to March 31, 1976

Estimated Additional Funding: \$791,774 to March 31, 1979

Funding Required -	April 1, 1976 to March 31, 1977	\$239,207	FY7
	April 1, 1977 to March 31, 1978	263,127	77
	April 1, 1978 to March 31, 1979	289,440	79

Project Manager: Edward J. Rice

791,874

2678  
791  
3310

B. Narrative Summary

USAID contracted with Oregon State University in 1966 to organize and operate a weed control research project primarily centered in Latin America. The basic objective of the effort was to assist LDCs initiate or strengthen weed control research programs with the ultimate aim of reducing yield losses of food crops due to weed competition. Considerable progress was made in achieving the objective especially in the

RESEARCH

Project Title Control of Weeds in the LDCs

Project Number 931-17-330-463

Starting Date 6/30/66 Termination Date 6/29/71

Cumulative Obligations	June 30, 1966	<u>478</u>
(in thousand \$)	FY 1969 Actual	<u>209</u>
	FY 1970 Estimate	<u>200</u>
	FY 1971 Proposed	<u>300</u>

Name of Contractor(s) Oregon State University  
 Contract Number(s) csd-3442  
 Cooperating Sponsor(s) Ministry of Agri. in Colombia and Ecuador & USAID Mission  
 Project Summary RAC  
 Date of RAC 2/66 Date Approved (RAC) 3/66 Evaluation Date (PAR) For

Purpose To develop simple, effective and efficient methods for weed control in LDCs, where weeds reduce production by 20 percent or more on millions of acres of cultivated crop land and where weeds prevent any crop production on additional millions of acres. Oregon State University has established the world's first International Plant Protection Institute of which this project is an integral part.

Description of Activity The research will: (1) identify the nature of the weed problems of the LDCs for each major ecological conditions; (2) test known methods of weed control for their effectiveness by type of weed and ecological condition; (3) develop improved or new methods and adaptations of existing weed control methods for each condition and cropping pattern; (4) determine the economic feasibility of each of the weed control methods and cropping systems at farm level; (5) train local technicians in weed research and demonstration techniques; (6) increase the weed research capability of local institutions in the LDCs; and (7) assist the host countries in obtaining effective weed control on farms.

Accomplishments In cooperation with herbicide manufacturers, researchers are testing new chemicals on U.S. mainland and Hawaii. Research has been initiated in Colombia and Ecuador with the Ministries of Agriculture and the University of Nebraska (Colombia). Local personnel have received training in weed control research. A weed control manual has been written.

Future Targets Effective weed control could be the most important and the least expensive method to achieve increased food production. Contractor estimates that with use of improved methods, weed control cost can be reduced by 50 percent. Effective weed control methods may be easier to develop than the task to spread their use. The contractor, private industry, and AID will use their resources jointly to reduce weeds as a major menace to food production.

countries of Colombia, Costa Rica, El Salvador and Ecuador. That contract with extension was terminated in February, 1973.

More recently AID/TAB requested Oregon State University to develop and evaluate weed control systems for representative farms in developing countries, with special emphasis on small- and medium-sized farms. The evaluation was to consider agronomic, economic and social effects of weed control systems. The work was to be performed in two countries: Brazil (Northeast) and El Salvador. The work plan for this contract initiated on March 1, 1973 extends to June 30, 1976 even though AID authorization only continues until December 31, 1976. The results reported herein refer only to those obtained to date (Oct. 2, 1975).

During the first complete production year (1974), approximately 1,800 plots were laid out, planted, treated, and evaluated -- in Northeastern Brazil and El Salvador -- for weed research in corn, beans, rice, potatoes, and a joint corn-bean cropping regime. Experimentation was designed to determine what effect (if any) weeds had on the test crops, and to observe the relative efficiency of various weed control systems, along with their relationship to other cultural practices.

The agronomic research, in combination with supplementary economic investigations conducted during 1974, permitted a number of conclusions for weed control systems, both in the Pernambuco Agreste, and in El Salvador. These conclusions apply only to the specified regions under the economic conditions prevailing in 1974, or to other areas with essentially similar ecologic and economic conditions.

Objectives

Proposed project research activities are designed, and will be implemented, with these broad objectives in view:

1. Identify optimal weed control technologies for representative small- and medium-size farms in selected developing countries; Evaluate the socio-economic impacts of these technologies for the farm and associated labor pool and develop agro-economic models of the farm sector in the test areas.  
Estimate efficiency trade-offs to achieve other societal goals such as greater rural employment and a more even distribution of income.

Activities related to research objectives

Objective No. 1: Identify optimal weed control technologies --

- (a) Develop, test, and evaluate cultural, mechanical, manual, chemical, and biological weeding systems -- alone and in combination -- to determine the most effective methods of control in major food crops.
- (b) Quantify production functions for weed control and other potential substitute agricultural inputs such as fertilizer row/plant spacing, and land preparation.
- (c) Specify rates of substitution between the different control methods and other inputs.

Objective No. 2: Evaluate the socio-economic impacts of these technologies

- (a) Investigate the social and economic consequences of alternative weed control systems

- (b) Develop agro-economic models of the farm sector, plus the associated labor pool, which will allow tracing the effects of national as well as farm weed control decisions and policies.
- (c) Incorporate into the models relevant primary and secondary data from selected underdeveloped countries.
- (d) Determine the constraints of farmer acceptance of various models.

Objective No. 3: Estimate efficiency trade-offs --

- (a) Evaluate the social and economic consequences of alternate weed control technologies in terms of their effects on social welfare criteria such as efficiency, employment, and income distribution.
- (b) Estimate the trade-offs between alternative societal goals in terms of reduced economic efficiency.

The development of appropriate weed control systems for small- and medium-size farms requires careful consideration of potential systems and the economic and social communities in which they are to be employed. Developing countries must design field experiments in order to maximize the informational flow used to determine weed control systems and also to obtain this information in a precise and efficient manner. To do this effectively a careful review of the available literature is required. It is also necessary to determine and specify particular problem areas and establish the state of knowledge which exists. This is the first activity to be pursued jointly by OSU and counterpart persons

Having completed this, it is anticipated that five types of experiments will be conducted, oriented as follows:

1. Substitution between labor and capital
2. Herbicide selectivity trials;

3. Interaction between agricultural inputs including weed control;
4. Comparison of various weed control methods in relation to availability of labor;
5. Comparison of manual, mechanical, chemical, and diverse integrated weed control systems.

The number of crops tested have been limited to corn, beans, and sorghum in Brazil and corn, beans, potatoes and rice in El Salvador. Other crops more important to small- and medium-size farmers in other regions must be investigated. Also, the final phase of such investigations must consider entire farm enterprise since weed control systems for individual crops must be compatible and mutually consistent. Fixed costs of weed sprayers, for example, could be reduced for a specific crop by utilizing the sprayers on additional crops. The reallocation would lower the fixed cost per sprayed hectare and increase the likelihood of their use on other crops. A similar argument could be made for the fixed costs of training farmers to use chemical sprayers.

Southeast Asia is an entirely different social and ecological area. A between-region comparison of optimal weed control systems would be informative and useful in international policy formulation of AID and other international agencies and organizations.

The wedding together of agronomic, economic and social data to perform a complete analysis of the utilization of a specific agricultural input is a relatively new effort, not only in developing countries, but also in the developed world. Only recently have major empirical efforts been started to evaluate effects on social welfare of technologies, governmental practices and policies, etc. Economic efficiency has generally been the

prime objective. Therefore, to some extent the project is breaking new ground, not only in terms of combining disciplines but also in its efforts to measure changes in social welfare, i.e., employment and income distribution, stemming from changed technology.

The initial work appears promising and, given additional research and testing in new areas, procedures should become available so that a series of weed control systems could be generally recommended, yet allowing individual producers to make selections based upon their own needs and ecological, economic, and social conditions.

## 2. Project Description and Background

### A. Background and Progress to Date

The original project's objectives were oriented toward developing institutional and staff weed control capabilities, within developing countries, that would contribute toward increased agricultural production. The project was particularly successful in raising the level of weed control research in Colombia and Ecuador, countries in which the project maintained resident staff.

Increased food production obviously remained a major goal for developing countries, but, as the first wave of results from the introduction of modern agricultural technology - the "green revolution" - were analyzed, some observers noted that not all segments of developing country citizenry were enjoying equal benefits from the change. Progressive, relatively affluent farmers tended to capture the bulk of the gains while the social and economic positions of small farmers and rural laborers showed little or no improvement. Recognition that new technology was not neutral in its social and economic effects precipitated a redefinition.

The second (current) contract incorporated new dimensions within two basic thrusts:

- to develop weed control systems for small- and medium-size farms in developing countries, encompassing traditional and modern techniques, or combinations;

- to evaluate the resulting systems in terms of effects on both economic and social conditions and goals; such as economic efficiency, unemployment, and income distribution, among others.

Activity under the current contract (started April 1, 1973, terminates December 31, 1975) has progressed according to the work plan. Findings, while preliminary, suggest that a trade-off does exist between societal goals: maximization of a specific objective, such as economic efficiency of production, may not lead to concurrent maximization of other community goals.

Project generated information suggests that small farmers in Northeastern Brazil are likely to continue to rely on manual (traditional) weed control methods, not only because these methods are economically efficient, but also because both on and off farm alternative opportunities are limited. In El Salvador, even with a high percentage of the total population being rural, reliance on mechanical and chemical weed control techniques will increase due to the existence of highly valued off-farm labor alternatives and opportunities. The consequences of these tendencies are presently being investigated and will be part of the final reports of the contract.

## 2. B. Problem

All plant life requires moisture, nutrients, and sunlight for growth; undesirable plants (weeds) compete with desirable plants for these available elements. Weeds have to be limited or controlled, in

most cases, to provide optimum growth conditions for the desired (crop) plants. Left uncontrolled, weeds have the potential to cause complete crop failure, although a common yield reduction falls in the range of 60-70%.

Most weed caused damage to crops occurs within the first 30 days of crop plant life, also usually a period of peak labor need. Often, land in production is limited by the amount of weeding that can be performed given the available labor supply. The effective constraint is not area of land available, but the weeding requirement of land in production and the availability of labor to perform the task of weeding.

Weed control, when practiced, traditionally relies on manual and mechanical means, a hand-held chopping device, or an animal drawn implement. More recently, improved mechanical and sophisticated chemical methods have been introduced and quickly accepted by some strata within developing countries. But these methods require a substantial capital expenditure cost for farms, industries and government. Many small- and medium-size farms do not utilize modern weed control technology due to the associated high capital costs, resistance based on cultural mores, or perceived negative social implications.

Even with the use of modern technology the relative importance of weed control is increasing. For rice production in the Philippines, 8% of the total man hours engaged in farm labor related to some phase of weed control as of 1966, compared with 17% in 1970. This situation stems in part from the effect of other agricultural inputs on weed

growth. Increased fertilizer use and improved culture of crop plants also benefit the weed population, thereby generating even stronger competition for available nutrients, water, and light.

To be accepted, technology must be proven economically efficient and consistent with the social environment and economic capability of farm enterprises. But the existence of external effects of technology, those effects not generally taken into direct account by farm decision makers, suggest that the consequences of new technology need to be evaluated from the point of view of a larger community. Employment, income distribution, and efficiency of production are decision variables commonly employed by government in evaluating the effects of technology and frequently form a basis for establishing policy. Without good estimates of the effect of alternate technologies and policies, governmental leaders have difficulty determining that policy which maximizes social welfare.

Socioeconomic constraints often dictate the magnitude and type of weed control technology employed; and the level of technology used affects agricultural output. Technology is not neutral with regard to its effect on people. As technologies evolve, certain individuals or groups within the community tend to experience benefits far out of proportion to other strata who may even be affected negatively. Not unexpectedly, several observers have contended that governments may be justified in monitoring, and possibly controlling, the adoption of technology. The control could be positive (through subsidy, for

example) as well as negative. Should mass starvation be imminent and if the use of modern technology could avert it, the adverse social adjustments from the implementation of the technology would likely be more than offset by the increased social welfare. Government would likely encourage its use.

Government has at its disposal an array of policies which affect the level of weed control technology employed. At one extreme, government may allow mechanization to occur at a rate consistent with the free market conditions and accept any social consequences.

At the other extreme, government may be directly involved in controlling the rate of adoption of new weed control technology to shield employment, particularly if alternatives for laborers are scarce.

The economic analysis of policies concerning weed control technology occurs on two levels. First, there is the technical question of the amount of change in output, employment, and income which results from each policy. Second, there is the question of who bears the cost and who receives the benefits. In other words, what will be the distribution of the benefits and costs?

Difficult questions arise when the conflict between societal goals is recognized. A desire for more equitable income distribution (made possible through partial control of weed technologies) may be inconsistent with achieving economic efficiency. Income distribution may be improved, but at the expense of reduced gross national product. Government decision makers are faced with determining the

proper policy to pursue. To arrive at rational decisions, they need information concerning the relative benefits and consequences of alternate technologies.

As a first step, the most efficient weed control system for various sizes and types of farms needs to be determined; only then can social welfare issues be evaluated. The weed control system of greatest efficiency becomes a bench mark to which other methods can be compared. The importance of this two-step approach cannot be overemphasized, nor can the fact that extensive research is required.

The responsibility to formulate policy and develop the necessary background data and analysis lies with the developing country. Trained manpower is required for this. At present there is an inadequate number of trained people working in the areas of weed science and production economics in most developing countries. The institutions in which they work are also often inadequately funded and administered. General knowledge of research conducted in other countries, or even regions of their own country, is frequently lacking. A weed researcher also needs awareness of the activities of his colleagues and of professional societies to perform his duties. Technical assistance reflects a continuing need to increase the capabilities and effectiveness of many developing countries in the battle to solve their weed control and associated problems.

2. C. Significance to AID Objectives

This project directly addresses three AID objectives:

a. improving the food supply in LDCs;

b. equitable distribution of research benefits to the rural poor;

c. consideration of rural employment opportunities.

Increasing the available food supply remains a major concern of AID and the developing countries, and this is attainable with inputs of improved weed control as one of the essential requirements. However, it has become increasingly apparent that other social and economic factors must be considered simultaneously. If food production increases are achieved largely on large-scale mechanized farms, the small farmer may find his means for a livelihood destroyed as his income source disappears. Countless others depend upon seasonal farm labor for their meager earnings. Therefore, this project proposes to correlate the effects of weed control on farms of various sizes with the trade-off effects on the rural economy and social structure. With such information, replicated sufficiently to be of significance, government planners will be in a better position to tailor a weed control system to the interests of a community or country as a whole.

### 3. Relation to Other Research

The contractor is one of the world's leading weed research centers. As such, there will continue to be communication ties with other U.S., international, and developing country organizations. Liaison exists and will be maintained with chemical companies whose research is important to the development of improved herbicides. Also, project personnel have developed and will maintain close liaison with the international research centers. Particularly strong ties, both research and training, already

exist between OSU and IRRI, CIAT, CATIE, CIMMYT, IITA, CIP, ICRISAT, AVRDC, WARDA, NWSRI (the National Weed Science Research Institution of Thailand) and BioTrop in Indonesia. Close coordination is maintained with all concerned AID Missions. This project, with a component in Southeast Asia, will permit the strengthening of linkages in that area of the world. OSU currently prepares and publishes a newsletter on weed research, training activities, workshops and conferences of international interest in its periodic Infoletter which is distributed nationally and worldwide.

#### Work Plan Research Component

#### Preface

The basic goals of the proposed continuation of project "Weed Control Systems for Representative Farms in Developing Countries," AID/CM/ta-C-73-23 are to develop weed control systems for small- and medium-sized farms in developing countries; to evaluate the socioeconomic impact of these technologies for the farm and associated labor pool, and to estimate efficiency trade offs to achieve other societal goals such as greater rural employment and more even distribution of income.

The work plan only covers the research component of the proposed

project. The proposal for three more years of project activity also contains a GTS component which has a separate work plan and will receive a separate review. Nevertheless, it is important that the proposal be viewed as a whole and accepted or rejected on that basis.

For clarity, the research work plan will be divided into four sections:

- I. Carry over activities of the previous work plan in Brazil and Central America
- II. Southeast Asia
- III. Central America
- IV. Corvallis-based Staff

I. Carry over Activities

(March 1, 1976 - June 30, 1976)

Personnel from the project will be stationed in three locations: Recife, Brazil; San Andres, El Salvador; and Corvallis, Oregon. Their activities will be discussed in that order.

A. Recife, Brazil

Only one agronomist of the three staff members previously stationed in Brazil will be there in March 1976. Basically, his position will be one of caretaker of the remaining experiments in the ground plus training and providing an advisory service to counterparts and Brazilian staff members of the State and Federal government. Specific work activities will include:

1. Maintaining and harvesting cassava field trials in Pernambuco State.

2. Continuing to train counterparts in effective methods of weed control research.
3. Providing an advisory and counseling service to Brazilian and international staff members in weed control.
4. Offering a series of short courses to governmental officials, Brazilian scientists, and farmers on project results and proper procedures in weed control.
5. Providing on-site support to the modeling effort being finalized in Corvallis; this could include obtaining additional data, checking inconsistencies, and model verification.
6. Writing reports on project activities for the Brazilian Government and USAID/Brazil.

The project agronomist will leave Brazil prior to June 30, 1976 and return to Corvallis.

B. San Andres, El Salvador

During Spring 1974, a new regional project leader was located in El Salvador. The change provided an opportunity to modify project goals for El Salvador and make them more consistent with project goals. Emphasis was placed on a series of field trials to obtain both agronomic and economic data. The trials were similar to those conducted in Brazil. Because of the new emphasis, continued close supervision of Central American countries other than El Salvador became impossible. Visits to these countries were made only once or twice a year to provide general encouragement and orientation of project goals.

The new emphasis continued in El Salvador, but at a slower pace than in Brazil, because of the lower number of personnel on the project. In

August 1975, an agricultural economist (graduate student) was assigned to the Salvadorian effort, but he was stationed in Corvallis.

Specific activities to be performed in El Salvador (Central America) during this work period:

1. Harvest and analyze results from field trials; potatoes and multiple cropping experiments will still be in the ground.
2. Initiate additional trials in the control of Cyperus rotundus (purple nut-grass).
3. Start several additional short term field trials, if needed to fill in data gaps.
4. Continue training of counterpart personnel in effective methods of weed control in El Salvador, as well as other Central American countries.
5. Continue collection of secondary social and economic data. (This activity will be supported by a visit of the agricultural economist from Corvallis).
6. Present a series of short courses to government officials, Central American scientists, and farmers on project results and proper procedures in weed control.
7. Write reports on project activities for the El Salvadorian Government.
8. Prepare bulletins and papers for scientific publications on project results.

C. Corvallis-based Staff

Project staff in Corvallis during this period will include the project director, technical support agronomist, information specialist, fiscal

officer, research agronomist (Brazil), two agricultural economists (Brazil and El Salvador), and support personnel. Basically their efforts will focus on terminating the modeling and preparing final reports and publications in addition to maintaining the existing worldwide communication network. Specific duties are to:

1. Evaluate and integrate project data into the appropriate models.
2. Refine parameters and technical coefficients of the models and generate final estimates of the optimal weed control systems for selected farm sizes.
3. Relax the efficiency criterion to allow for alternative social goals and estimate the costs of their obtainment in terms of changes in net farm incomes.
4. Prepare and submit reports and publications on project research.
5. Install field trial in Oregon to provide preliminary evaluation of experimental herbicides.
6. Continue work on a revised edition of Weed Research Methods Manual in Spanish and English.
7. Develop specific plans for activities in Southeast Asia and Central America.
8. Order, design, and build necessary equipment and supplies for new posts.
9. Continue a worldwide advisory service to the weed science community.
10. Serve as secretariat for the International Weed Science Society.
11. Maintain linkages with international research institutions, international agencies, and regional weed research societies.

12. Collect material, prepare and edit copy, layout, and expedite production of IPPC INFOLETTER at least once during the period.
13. Perform necessary administrative and fiscal duties related to project activities.
14. Perform necessary activities to open new project locations in Southeast Asia and Central America.

## II. Southeast Asia

The Royal Thai Government has requested that Oregon State University, through the International Plant Protection Center, send a team to Thailand to help in the establishment of the National Weed Science Research Institute (NWSRI). Two weed scientists funded under the project will be sent in support of this request with an agricultural economist serving the team from Corvallis. The basic research goals will remain the same, as previously stated.

The work plan will be divided into three periods.

- A. July 1976 - Feb. 1977. A period of preparation in which agronomists will establish themselves in Bangkok and initiate activities to identify the key weed control problems of the region.
- B. March 1977 - Feb. 1978, the first crop year.
- C. March 1978 - Feb. 1979, the second crop year.

The work specified in this plan to be accomplished concentrates on what are believed a priori to be three critical issues. On site experience will give rise to additional research needs which have not been anticipated and cannot adequately be assessed. Modification of the plan may, therefore, be required over time.

A. 1976-1977

1. Identify, secure and ship needed equipment.
2. Two agronomists arrive in Thailand, ETA July 1976.
3. Review proposed work plan and establish research priorities with Thai research officials.
4. Establish contacts and linkages with AID, Thai government, and regional government officials, as well as personnel of IRRI, BIOTROP, and IACP.
5. Develop agreement between OSU and Thai government pertaining to counterparts and logistic support.
6. Identify research area.
7. Review agronomic, economic, and social literature pertaining to the research area.
8. Observe and catalog soil, climate, cropping practices, weed problems and existing weed control methods.
9. Identify crops to be studied (initially these will include rice, cassava, and corn).
10. In cooperation with Corvallis-based agricultural economist, determine the need to conduct a farm survey of the research area after a review of the available literature.
11. Similarly determine the need for a survey of the agricultural labor force.

B. 1977-1978

1. Establish field trials in research at selected locations. At least five different orientations of the field trials will be

initiated.

- a. Substitution between labor and capital (capital may occur in various forms, i.e. herbicides and mechanical weed control methods).
- b. Herbicide selectivity trials.
- c. Interaction between agricultural inputs, i.e. fertilizer, seeding rate, including weed control.
- d. Comparison of various weed control methods in relation to availability of labor.
- e. Comparison of integrated weed control systems including combination of manual, cultural, chemical, and biological methods.

Each experiment will be installed using both traditional and modern land preparation techniques. Yield, time requirements, and cost data will be kept on all trials.

2. Questionnaires will be developed, pretested, and taken from the farm and agricultural labor populations, if required.
3. Comparative cost data will be budgeted for alternative weed control systems by farm size utilizing field trials, secondary, and questionnaire data.
4. Production functions will be fit to the field trial data from which initial estimates of interaction relationships and rates of substitution between alternative weed control methods can be estimated.

5. Cross sectional production functions will be fit to the survey farm data to determine the importance of weed control in the general farm context.
6. Previously used farm models used in Brazil will be examined as to their acceptability in Thailand. Modification of the models will be initiated if required.

C. 1978-1979

1. Promising field trials will be selected, refined and repeated.
2. New experiments on promising lines of investigation will be established.
3. Field trials will be expanded to include additional crops as well as multiple cropping.
4. Farm and agricultural labor populations will be resampled, if required, to obtain additional information, or changes over time.
5. Final specification of the model will be made.
6. Parameter and technical coefficients will be refined and incorporated into the models.
7. Optimal weed control systems will be specified by farm size.
8. Efficiency criteria will be relaxed. The costs of obtaining less unemployment, a more equal income distribution, and similar social goals will be measured in terms of the reduction in net farm income.
9. Reports and publications on project research will be prepared.

III. Central America

The Regional Office of Central America Programs (ROCAP) has requested OSU to participate in a research program in multiple cropping at CATIE,

Turrialba, Costa Rica. The program will involve many agricultural disciplines, but all oriented toward improving the productivity of the small- and medium-size farmer through multiple cropping. Preliminary weed research in multiple cropping has been conducted by OSU in El Salvador, but much remains to be done.

Two agronomists will be stationed in Costa Rica. One, however, will provide general technical assistance, while the other conducts the research program. The OSU based agricultural economist will service the group from Oregon.

The work plan will be divided into the same time periods used in Southeast Asia.

The activities in Central America will be identical to those for Southeast Asia except that:

- a) The two agronomists will arrive in August 1976;
- b) the host government will be the Government of Costa Rica;
- c) the linkages will be with the GOCR, CATIE, other Central American government agencies, CIAT and ALAM.

#### IV. Corvallis-based Staff

The responsibility of Corvallis-based staff will be divided between the research and the general technical assistance (GTS) components of the project. Generally this will involve one-third time research and two-thirds time GTS with the exception of the agricultural economist and the graduate student who will be full time research.

General duties of the Corvallis-based staff in the research area are to provide necessary logistic and technical support to field based staff,

provide liaison with AID/Washington, review and supervise field effects, and to manage general administrative and fiscal affairs.

Specific activities of the individual staff members are listed below. All GTS activities are funded under separate project.

**A. Project Leader**

This is a half-time position to be divided 1/3 research and 2/3 GTS.

His responsibilities will include:

1. General project administration and management.
2. Coordination of project personnel and inputs from the OSU Departments of Agronomic Crop Science and Agricultural and Resource Economics.
3. Maintaining contacts with AID/Washington and national and international weed science and general research institutions and agencies.
4. Maintaining close liaison with the AID/University of California project "Pest Management and Related Environmental Protection."

**B. Weed Control Specialist (1/3 research, 2/3 GTS)**

The primary research function of the Corvallis based agronomist is to provide technical support for the in-field staff. Specific duties are to:

1. Inform field staff of current developments, trends, and activities in the weed science research community.
2. Assist in planning, conducting, and evaluating field research activities.
3. Conduct field trials to test promising experimental herbicides and new weed control methods.

4. Supervise ordering, designing, building, and shipping equipment and supplies needed by field staff.

C. Information Specialist (1/3 research, 2/3 GTS)

In order to insure acceptance of research results by governmental policy makers as well as individual farmers, information must be available to them in an acceptable and understandable form. While many of these activities may be more in the area of general technical service, research is not finished until properly reported. The major responsibility of the Information Specialist is to insure rapid utilization of the research results as they are developed. Specific duties are:

1. Advise project staff on the publication and distribution of weed control research results.
2. Assist in the preparation of both technical and periodic reports and the preparation of proposals.

D. Fiscal Officer and Translator (1/3 research, 2/3 GTS)

Fiscal monitoring and control, budget preparation, and general accounting are routine responsibilities of this officer. In addition she performs a translation function as required, being proficient in Spanish and Portuguese.

Specific research responsibilities are:

1. Supervise and/or translate articles, letters, and research materials from Spanish and Portuguese to English and vice versa.
2. Edit research reports and publications.

E. Agricultural Economist (1.0 research)

The responsibility of the agricultural economist is to supervise and perform the socio-economic investigation of the project in

Southeast Asia and Central America. He will live in Corvallis and commute to work areas as required. Much of the analytical work described in the sections of the work plan dealing with Southeast Asia and Central America will be performed on campus.

Specific duties are to:

1. Conduct socio-economic research on weed control systems in Southeast Asia and Central America.
2. Perform necessary cost budgeting on alternative weed control systems.
3. Identify economically efficient weed control systems.
4. Estimate rates of substitution between alternate weed control methods.
5. Develop and/or modify models which will allow the evaluation of the efficiency costs of obtaining alternate social objectives, as they relate to weed control systems.
6. Perform necessary analyses and prepare reports on findings.

Budget Analysis

The three-year budget, shown below, reflects the views of TA/AGR and the Contractor with respect to the continuation of essential functions at the levels projected therein. It allows for approximately a 10 percent annual rate of inflation.

	Funding Period			Total 3 Years
	<u>4/76-3/77</u>	<u>4/77-3/78</u>	<u>4/78-3/79</u>	
Salaries and Wages	108,884	119,772	131,749	360,405
Consultants	0	0	0	0
Payroll Assessments	16,909	18,600	20,460	55,969
Indirect Costs, Fringe, Overhead	43,915	48,307	53,138	145,360
Travel and Trans- portation	26,138	28,752	31,627	86,517
Allowances	18,188	20,006	22,008	60,202
Other Direct Costs	2,437	2,680	2,948	8,065
Equipment, Vehicles, Material & Supplies	22,736	25,010	27,510	75,256
TOTAL -	239,207	263,127	289,440	791,774

Impact on Environment

The Oregon State University has recently begun to survey small and medium sized farms in Latin American to determine the most economical weed control systems. Prior to this research, the basic activity in this field was in the testing and promotion of herbicides.

Alternative methods of weed control include hoeing, improved seed bed preparation, competitive planting dates, and populations, placing of fertilizer to minimize weed feeding, and other forms of mechanical control. Invariably, the most economical package will include many of the weed control methods listed above with the use of a herbicide as one possibility.

To assure a minimum of danger to the applicator and to the environment, training of applicators in the safe use of herbicides will be a continuous activity. The impact of this project should be positive since it is seeking alternative methods of control. Only biodegradable, relatively non-persistent, low-toxicity herbicides will be recommended.

#### The role of small farmers and the rural poor

The basic goal of this project is to develop weed control systems for small - and medium-size farm operations in order to establish efficiency trade-offs to achieve societal goals.

#### The role of women

Women have traditionally been involved in weed control activities in the LDCs. A major goal of this project is to survey the farm population and the associated agricultural labor pool. The results will provide coefficients for production, labor availability; consumption, and human health for the socioeconomic models.

In those areas where mechanized (power driven) or chemical control appear efficient and economical as a supplement to manual control, on-farm labor performed by women will be reduced.

General Appraisal

The 1975 PAR stressed the need to either substitute a GTS project which provides specific authority to conduct some research or add a GTS competence to the present research contract to finance technical assistance. The premises for these suggestions are:

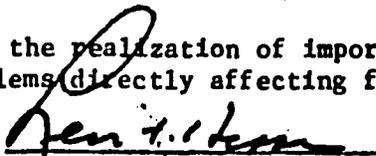
1. Weed control is an important agency activity;
2. OSU has demonstrated an extraordinary capacity to relate to LDC personnel; and
3. LDCs should be able to take advantage of research developed over the last decade, and principally that by OSU in the last two years, and give the LDC national institutions full access to this research.

In light of this PAR, there are two contract proposals being offered, a GTS proposal and a research proposal. In this research proposal, OSU will follow the suggestions of the 1975 PAR by continuing to evaluate the socioeconomic implication of various weed control systems on small- and medium-sized farms in the LDCs. Also a weed research team will collaborate with ROCAP on multiple cropping and a weed researcher will be assigned to Thailand to assist the Thai in setting up a weed research institute as well as be the Asian representative.

PROPOSING OFFICE GENERAL EVALUATION AND RECOMMENDATION

The project continues to hold the highest priority among the projects supervised by the Office of Agriculture and is an integral part of the program of the Division of Crop Production. It addresses directly, ~~the improvement of the productivity for~~ the all important problems of hunger and malnutrition as well as making a contribution towards the improvement of the lot of the small farmer.

A three year extension will allow for the realization of important research in progress and solution of problems directly affecting food production and nutrition in the LDCs.

  
Leon F. Hesser, Director  
Office of Agriculture, TAB

OFFEROR'S ANALYSIS OF COST PROPOS

INSTRUCTIONS TO OFFERORS

1. The "Offeror's Analysis of Cost Proposal" form is a standardized document which an offeror must submit to the Agency for International Development (A.I.D.) in connection with all negotiated procurements. (See AIDPR 7-3.807.2(d))

2. Use of this form is mandatory for all negotiated procurements for which written cost or pricing data is required under FPR 1-3. 807-3, and may be used in other procurements at the discretion of the Contracting Officer.

3. The offeror must also submit the supplementary data as detailed in the footnotes on the reverse side.

4. By submission of this proposal, the offeror grants to the Contracting Officer or his authorized representative, the right to examine, for the purpose of verifying the cost or pricing data submitted, those books, records, documents, and other supporting data which will permit adequate evaluation of such cost or pricing data, together with the computations and projections used therein. This right may be exercised in connection with any negotiations prior to contract award.

5. The footnotes on the reverse side, in addition to detailing the required supplemental data, provide information which will be of use in completing the "Cost Proposal" below.

RESEARCH COMPONENT 4/1/76-3/30/77 (12 months)

I. Salaries 1/		MAN-MONTHS	ESTIMATED COST
<b>A. U.S. Personnel</b>			
Home Office Professional		34	\$ 54,576
Home Office Nonprofessional		12.4	\$ 10,355
Field Staff Professional		24	\$ 42,277
Field Staff Nonprofessional			\$ -
Total U.S. Salaries			\$ 107,208
<b>B. Cooperating or Third Country Nationals</b>			
Field Staff Professional			\$ -
Field Staff Nonprofessional			\$ 1,676
If these salaries will be paid in U.S. dollars, enter the amount here:			\$ 1,676
If these salaries will be paid in local currency, enter the amount and currency below			
Amount:	Currency:		
<b>II. Consultants 2/</b>			
Consultant Fees (Domestic)			\$ -
Consultant Fees (Overseas)			\$ -
Total Consultant Fees			\$ -
<b>III. Fringe Benefits (Payroll Costs) 3/</b>			\$ 16,909
<b>IV. Overhead 4/</b>			
	BASE	RATE	
Home Office (On-campus)	\$ 41,931	% 45.22%	\$ 29,362
Field Staff (Off-campus)	\$ 43,953	% 33.11	\$ 14,553
Total Overhead			\$ 43,915
<b>V. Travel and Transportation 5/</b>			
U.S. Travel (Personnel and Dependents)			\$ -
International Travel (Personnel and Dependents)			\$ 4,432
Other Personnel Travel			\$ 10,706
Transportation of Household Effects, Baggage & Vehicles			\$ 10,200
Storage of Household Effects & Vehicles			\$ 800
Other (Describe)			\$ -
Total Travel & Transportation			\$ 26,138
<b>VI. Allowance 6/</b>			
Category			
Post Differential			\$ 3,843
Quarters			\$ 7,500
Temporary Lodging			\$ 2,835
Education			\$ 4,010
Educational Travel			\$ -
Supplemental Post			\$ -
Separate Maintenance			\$ -
Per Diem			\$ -
Total Allowances			\$ 18,188
<b>VII. Other Direct Costs 7/ (Specify)</b>			
Communications, computer costs, medical examinations, insurance on vehicles, customs service, etc.			\$ -
Total Other Direct Costs			\$ 2,437
<b>VIII. Equipment, Vehicles, Materials and Supplies 8/</b>			
Equipment (Title in cooperating country)			\$ -
Equipment (Title retained in A.I.D.)			\$ 3,550
Material and Supplies			\$ 4,266
Vehicles			\$ 8,920
Freight			\$ 6,000
Total Equipment, Vehicles, Materials and Supplies			\$ 22,736
<b>IX. Participant Training 9/</b>			
Number of Participants:			
Training (Tuition, Fees, etc.)			\$ -
Travel and Subsistence			\$ -
Total Participant Training			\$ -
<b>X. Subcontracts 10/ (Specify)</b>			
			\$ -
			\$ -
Total Subcontracts			\$ -

<b>XI. General &amp; Administrative Rate</b> <u>12</u>			<b>ESTIMATED COST:</b>
Base:	Rate	%	\$ -
<b>XII. Subtotal (Estimated Cost Exclusive of fixed Fee or Profit)(Items I-XI)</b>			\$ 239,207
<b>XIII. Fixed Fee or Profit</b> <u>12</u>			
Base:	Rate	%	\$
<b>XIV. Grand Total (Items XII &amp; XIII)</b>			\$
If more space is required and for items XV thru XX where additional information is necessary, please use separate sheet. Indicate item number to which answer applies and staple to form.			
<b>XV. Has any government agency performed an audit of your organization within the past 12 months?</b>			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
(If yes, identify the contract, the agency, the date, and the number of the audit report.)			
<b>XVI. Will you require the use of any government property in performing this contract?</b>			
<input type="checkbox"/> Yes <input type="checkbox"/> No (If yes, specify)			
<b>XVII. Will the source of all commodities procured under this contract be the United States?</b> <u>12</u>			
<input type="checkbox"/> Yes <input type="checkbox"/> No (If not, list the exceptions.)			
<b>XVIII. Have you performed any contracts for A.I.D. or other government agencies in the past ten years?</b>			
<input type="checkbox"/> Yes <input type="checkbox"/> No (If yes, identify by Agency and contract number.)			
<b>XIX. Will you require an advance payment or a Federal Reserve Letter of Credit (to be filled in by educational institutions and nonprofit organizations only).</b>			
<input type="checkbox"/> Yes <input type="checkbox"/> No (If yes, in what amount?)			
<b>XX. Is there any overtime included in this cost proposal?</b>			
<input type="checkbox"/> Yes <input type="checkbox"/> No (If yes, explain the amount and what it will be used for.)			
<b>XXI. What is the average number of days per year used in the calculation of the above cost proposal for:</b>			
Vacations _____ Holidays _____ Other (explain)			
Sick Leave _____ Home Leave _____			
This proposal, with the supplementary data, is submitted for use in connection with RFP _____ or the per seel titled " _____ " and reflects our best estimates, as of this date, in accordance with the instructions to Offerors and Footnotes.			
<b>TYPE NAME AND TITLE</b>		<b>SIGNATURE</b>	
<b>DATE</b>		<b>DATE</b>	

#### FOOTNOTES

In addition to the cost analysis on this form, the offeror is required, in good faith, to submit with this form the additional data, supporting schedules, and substantiation which are reasonably necessary for the conduct of an appropriate review and analysis in light of the facts of this particular procurement. In order to obtain a reasonable and equitable contract price, it is essential that there be a clear understanding of: (a) the existing, verifiable data; and (b) the judgmental factors applied in projecting from known data to the estimated price. In short, the offeror's estimating process should be clear to the negotiator.

The footnotes below include questions and explanations of the items of the Cost Analysis. The supplementary data should include all the following information, where applicable, as well as any other pertinent facts.

1. Salaries (U. S. Personnel and Cooperating or Third Country Nationals)

A. An individual is considered a professional if he is engaged in an occupation requiring advanced training in some liberal art or science, usually involving mental rather than manual work and who is qualified in his field by the standards of the profession. Examples are: professors, teachers, engineers, economists, scientists, and research associates.

The nonprofessional category includes those not considered professional such as graduate or undergraduate assistants, secretaries, clerks, technicians, administrative aides, research assistants, and trainees.

B. What are the position titles in each category? How many man-months are anticipated in each position? What is the anticipated salary of each position? Will each position involve work under this contract on a full time basis? If not, what percentage of each position's time will be used for work under this contract?

2. Consultants -- In what fields is the need for consultants anticipated? How many consultants are needed? How many man-days are anticipated for each consultant? What is the anticipated fee per manday for each consultant?

3. Fringe Benefits -- Which fringe benefits are included in this amount? What is the rate of each fringe benefit? Are fringe benefits included in your established personnel procedure? Include a copy, if available, of your established personnel procedure concerning fringe benefits, allowances, leave, etc.

4. Overhead -- What costs are included in the overhead pool? Which direct costs are included in the overhead base? What were the rates established by the most recent government audit?

5. Travel and Transportation -- Indicate how many round or one-way trips to where, an estimate of how many dependents will be traveling, and the anticipated weight of household effects which will be shipped and/or stored, etc.

6. Allowances -- A.I.D. employs the "Standardized Government Travel Regulations" or "Standardized Regulations (Government Citizens Foreign Areas)" as applicable, in establishing the rates of, and criteria for, level and overseas allowances. If the allowances used in the cost analysis exceed the rates permitted by these Regulations, explain, indicate which allowances are applicable, and how much of each is anticipated, (i.e., educational travel for four dependents, 20 days per diem).

7. Other Direct Costs -- Enumerate all other direct costs, such as medical examinations, communications, etc.

8. Equipment, Vehicles, Materials, and Supplies -- List the types of equipment, materials, and/or vehicles in each category which will be purchased for use under the contract, and the cost of each.

9. Participant Training -- Where will participants be trained? In what fields will they be trained? What is the tuition per participant? What do the fees cover? How much travel is involved? Where? How much is allowed for subsistence?

10. Subcontracts -- What type of work will be subcontracted? Approximately what percentage of the total scope of work is it? Whom will you subcontract with? What is the anticipated amount of each subcontract?

11. General and Administrative Rate -- Show, in detail, the process by which you arrived at the General and Administrative rate.

12. Fixed Fee or Profit -- Show, in detail, the process by which you arrived at the fixed fee or profit.

13. Source Certificate -- The following conditions should apply to any commodity procurement financed under the proposed contract by U.S. dollars:

A. The source of the commodity shall be the United States, and the commodity shall have been mined, grown, or through manufacturing, processing, or assembly produced in the United States. The term "source" means the country from which a commodity is shipped to the cooperating country or the cooperating country if the commodity is located there at the time of purchase. If, however, a commodity is shipped from a free port or bonded warehouse in the form in which it is received therein, "source" means the country from which the commodity was shipped to the free port or bonded warehouse.

B. A produced commodity purchased in any transaction will not:

1. Contain any component from countries other than Free World countries, as defined in A.I.D. Geographic Code 899.

2. Contain components which were imported into the country of production from such Free World countries other than the United States; and

(i) such components were acquired by the producer in the form in which they were imported; and

(ii) the total cost of such components (delivered at the point of production) amounts to more than 10 per cent, or such other percentage as A.I.D. may prescribe, of the lowest price (excluding the cost of ocean transportation and marine insurance) at which the supplier makes the commodity available for export sale (whether or not financed by A.I.D.).

C. Exception for Printed or Audio-visual Teaching Materials -- The geographic source of teaching materials (printed or audio-visual) procured with funds charged against A.I.D. appropriations, may, to the extent necessary, be progressively expanded to include the aid receiving country, Code 891 countries, and Code 899 countries, in addition to the United States when:

1. Effective use of the printed or audio-visual teaching material depends on their being in the local language.

2. Such materials are intended for technical assistance projects or activities financed by A.I.D. in whole or in part.

3. Other funds, including U. S.-owned or -controlled local currencies, are not readily available to finance the procurement of such materials.

Geographic Code 899 is defined as "any area or country in the Free World, excluding the cooperating country itself, when used as a possible source of A.I.D.-financed purchases. Geographic Code 901 is defined as "any area or country in the Free World, excluding the cooperating country itself and the following developed countries: Australia, Austria, Belgium, Canada, Denmark, France, Germany (Federal Republic), Italy, Japan, Luxembourg, Monaco, Netherlands, New Zealand, Norway, South Africa, Spain, Sweden, Switzerland, and the United Kingdom.

D. ADDITIONAL DETAILS FOR OFFEROR'S ANALYSIS OF COST PROPOSAL

RESEARCH COMPONENT 4 /1/76- 3/30/77 (12 months)

	<u>F.T.E.</u>	<u>Man-Months</u>	<u>Budget</u>	<u>Estimated Cost</u>
<b>I. Salaries</b>				
<b>A. U. S. Personnel</b>				
Home Office Professional				
Project Leader (S. F. Miller)	.33	4	8,637	
Research Agronomist (L. C. Burrill)	.33	4	6,785	
Information Specialist (A. Deutsch)	.33	4	6,604	
Fiscal Affairs/Translator (G. Knapp)	.33	4	4,550	
Agricultural Economist (to be appt.)	1.00	12	22,000	
Research Assistant, Weed C. (R. Chase)	.50	6	6,000	
	2.82	34	(54,576)	
Home Office Non-Professional				
Secretary (M. Wade)	.33	4	2,913	
Secretary (S. Hines)	.20	2.4	1,672	
Research Technician (F. Fraser)	.33	4	4,084	
Secretary (to be appt.)	.17	2	1,686	
	1.03	12.4	(10,355)	
Total On-Campus-----				64,931
Field Staff Professional				
Research Agronomist, Central America, (M. Shenk)	1.00	12	21,913	
Research Agronomist, S. E. Asia (H. H. Fisher)	1.00	12	20,364	
	2.00	24	(42,277)	
Total U. S. Salaries-----				(107,208)
<b>B. Cooperating or Third Country Nationals</b>				
<u>Field Staff Non-Professional</u>				
Secretary, El Salvador (D. Casanova)	.33	4	1,676	
Total Off-Campus Salaries-----				43,953
TOTAL SALARIES AND WAGES-----				108,884

II. Consultants -- none		
III. Fringe Benefits (Payroll Costs)		
15% x \$108,884 + \$3,843 (post differential)		16,909
IV. Overhead (Indirect Costs)		
Home Office (On-Campus)    45.22% x \$64,931	29,362	
Field Staff (Off-Campus)   33.11% x 43,953	14,553	
Total Overhead-----		43,915
V. Travel and Transportation		
U. S. Travel (Personnel and Dependents)		
International Travel (Personnel and Dependents)		
Send one family to Central America	1,312	
Send one family to Southeast Asia	<u>3,120</u>	
	4,432	
Other Personnel Travel		
One round trip for meeting of Weed Science Society of America (estimated)	423	
One round trip for meeting of Western Society of Weed Science (estimated)	200	
One round trip for meeting of the Southern Weed Science Society (estimated)	550	
One round trip to meeting of American Association of Agricultural Economists (estimated)	575	
Research share of four round trips to Southeast Asia	2,791	
Research share of four round trips to Central America	1,585	
In-country travel: Central America	2,250	
In-country travel: Southeast Asia	2,250	
Oregon travel and miscellaneous	82	
	<u>10,706</u>	
Total Travel-----		15,138
Transportation of Household Effects, Baggage and Vehicles		
One family to Southeast Asia	5,200	
One family to Central America	<u>5,000</u>	
Total Transportation of Household Effects, etc.---		10,200
Storage of Household Effects and Vehicles		
Storage for one family in Southeast Asia, est.	400	
Storage for one family in Central America, est.	<u>400</u>	
Total Storage-----		800
TOTAL TRAVEL AND TRANSPORTATION-----		26,138

VI. Allowances

Post Differential

One staff member in Southeast Asia 1,992  
One staff member in Central America 1,851

Total Post Differential----- 3,843

Quarters

One family in Southeast Asia 4,300  
One family in Central America 3,200

Total Quarters----- 7,500

Temporary Lodging

One family to Southeast Asia 1,890  
One family to Central America 945

Total Temporary Lodging----- 2,835

Education

One family in Southeast Asia 2,560  
One family in Central America 1,450

Total Education----- 4,010

TOTAL ALLOWANCES----- 18,188

VII. Other Direct Costs

Communications 583  
Computer costs 1,357  
Medical Examinations 250  
Insurance on vehicles, customs service, etc. 247

TOTAL OTHER DIRECT COSTS----- 2,437

VIII. Equipment, Vehicles, Materials and Supplies

Equipment (Title retained in A.I.D.)  
Technical equipment, sprayers, etc. 2,500  
Cameras, w/lenses 500  
Research share of electric typewriter 250  
Field tape recorder 50  
Research share of desk calculator 250

Total Equipment----- 3,550

Material and Supplies

Technical supplies 1,000  
Office supplies and postage 2,000  
Books and journals 833  
Auto supplies 133  
Film and developing 300

Total Material and Supplies----- 4,266

**Vehicles**

One crew-dab pick-up truck 5,050  
One regular 1/2 t. pick-up truck 3,870

Total Vehicles----- 8,920

**Freight**

Ship two vehicles, other freight charges 6,000

TOTAL EQUIPMENT, VEHICLES, MATERIALS AND SUPPLIES----- 22,736

IX. Participant Training -- none

X. Subcontracts -- none

TOTAL ESTIMATED

RESEARCH BUDGET, 1976-1977-----239,207

Project Title & Number: Weed Control Systems for Representative Farms in Developing Countries

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																												
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p><b>A1. Sector Goal:</b> To increase the quality &amp; quantity of food crop production and the welfare of the small and medium size farmers of the cooperating LDCs by assistance in integrated weed control.</p>	<p>Measures of Goal Achievement:</p> <p><b>A2.</b></p> <ol style="list-style-type: none"> <li>1. Increase crop production in the cooperating LDCs.</li> <li>2. Improved welfare of farmers both economically and socially.</li> <li>3. Institutional initiatives for implementing weed control programs.</li> </ol>	<p><b>A3.</b></p> <ol style="list-style-type: none"> <li>a) Numerous publications disseminated.</li> <li>b) Several weed science societies formed in LDCs.</li> <li>c) Substantial crop yields gained worldwide</li> <li>d) New weed control programs and projects in LDCs.</li> <li>e) LDC records and on-site inspection.</li> </ol>	<p>Assumptions for achieving goal targets:</p> <p><b>A4. Assumption for Achieving Purpose:</b></p> <ol style="list-style-type: none"> <li>a) That weed control systems will substantially increase food crop yields.</li> <li>b) That LDCs will emphasize programs for integrated weed control on small farms</li> <li>c) That rural population welfare will improve through project activities.</li> </ol>																												
<p>Project Purpose:</p> <p><b>B1. Purpose:</b></p> <ol style="list-style-type: none"> <li>a) Develop weed control systems for small and medium farms in selected developing countries to increase crop yields.</li> <li>b) Evaluate the new weed control technology in terms of the social and economic goals in LDCs.</li> <li>c) Improve weed research capabilities of the LDCs to increase food crop production and welfare of rural population.</li> </ol>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p><b>B2. End of Project Status:</b></p> <ol style="list-style-type: none"> <li>a) Existence of a functioning research control system for weeds in the LDCs for small and medium sized farmers.</li> <li>b) Quantitative data of benefits and costs of weed control systems using multiple objective criteria.</li> <li>c) Trained weed specialists capable of working in multidisciplinary pest management integrated control systems.</li> </ol>	<p><b>B3.</b></p> <ol style="list-style-type: none"> <li>a) Reports of weed control systems. On-site inspection.</li> <li>b) Cost-benefit reports of weed control systems.</li> <li>c) Report on training performed. LDC, USAID, contractor records on participants.</li> </ol>	<p>Assumptions for achieving purpose:</p> <p><b>B4.</b></p> <ol style="list-style-type: none"> <li>a) LDC recognition of need for modification of practices for small farmers.</li> <li>b) Size and sophistication of farm will influence cost/benefit of system.</li> <li>c) There is a lack of trained research personnel.</li> </ol>																												
<p><b>B1. Outputs:</b></p> <ol style="list-style-type: none"> <li>a) Effective and economic weed control systems for small and medium farm in the LDCs.</li> <li>b) Evaluation of social and economic effects of weed control systems.</li> <li>c) Trained LDC technicians in weed control technology, systems research, survey analysis, and multidisciplinary research.</li> </ol>	<p>Magnitude of Outputs:</p> <p><b>C2.</b></p> <ol style="list-style-type: none"> <li>a) Unquantified; depends on area of adoption of systems developed in LA and EA. Systems will be developed for several farm sizes.</li> <li>b) Unquantified; depends on area of adoption. The quantity of the effects is precisely what is being evaluated.</li> <li>c) In each country not less than six researchers should be trained in weed control.</li> </ol>	<p><b>C3.</b></p> <p>Report records, publications of LDCs, USAID, and contractor.</p> <p>The development of various weed control systems for small and medium farms.</p>	<p>Assumptions for achieving outputs:</p> <p><b>C4.</b></p> <ol style="list-style-type: none"> <li>a) That the procedures and plans promulgated will evolve into national and institutionalized programs for integrated weed control systems.</li> <li>b) That social and economic status will effect level of technology of most adaptive system.</li> <li>c) There are researchers desiring training.</li> </ol>																												
<p><b>B2. Inputs:</b></p> <ol style="list-style-type: none"> <li>a) Budgetary support, project monitoring, technical support and assistance AID/Washington.</li> <li>b) Contractor will provide staff, administrative, logistic support, and technical expertise to carry out programs.</li> <li>c) The LDCs will provide adequate counterparts and physical facilities for technicians.</li> </ol>	<p>Implementation Target (Type and Quantity)</p> <p><b>D2.</b></p> <p>Contractor: Oregon State Univ. (OSU)</p> <table border="0"> <tr> <td>a) AID Funding</td> <td>FY 77</td> <td>78</td> <td>79</td> </tr> <tr> <td>b) OSU</td> <td>239,000-263,000</td> <td>290,000</td> <td></td> </tr> <tr> <td>Core staff</td> <td>26</td> <td>26</td> <td>26</td> </tr> <tr> <td>Support staff</td> <td>18</td> <td>18</td> <td>18</td> </tr> <tr> <td>Field staff</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CA</td> <td>12</td> <td>12</td> <td>12</td> </tr> <tr> <td>Consultant</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table> <p>c) LDC funding as required</p>	a) AID Funding	FY 77	78	79	b) OSU	239,000-263,000	290,000		Core staff	26	26	26	Support staff	18	18	18	Field staff				CA	12	12	12	Consultant	0	0	0	<p><b>D3.</b></p> <ol style="list-style-type: none"> <li>a) AID/W records.</li> <li>b) OSU contract, reports, records.</li> <li>c) LDC and OSU reports and on-site inspection.</li> </ol>	<p>Assumptions for providing inputs:</p> <p><b>D4.</b></p> <ol style="list-style-type: none"> <li>a) Necessary support and project monitoring will be available through AID/Washington</li> <li>b) OSU will maintain subject discipline and continue to supply technical assistance in timely fashion.</li> <li>c) The LDCs will support the work with adequate counterpart personnel and necessary logistic support.</li> </ol>
a) AID Funding	FY 77	78	79																												
b) OSU	239,000-263,000	290,000																													
Core staff	26	26	26																												
Support staff	18	18	18																												
Field staff																															
CA	12	12	12																												
Consultant	0	0	0																												

**R&DC Minutes for 11/18/75**

**Project: Weed Control Systems for Representative Farms in Developing Countries, (extension), Research 3 years. \$791,774**

**Contractor: Oregon State University**

**Project Manager: Edward J. Rice, TA/AGR**

**Discussion Highlights:**

This project has a companion project being developed under GTS funding, although not ready for presentation to the R&DC at this time. Thus certain aspects of staffing and budgeting may not appear to be consistent within this Project Statement.

The continuation of work in Brazil was questioned. The answer was that the Brazil work is scheduled to be terminated in June of 1976. Dr. Long commented on the use of specific countries as laboratories for the research. The purpose is to get specific answers, but the spinoff of methodology for other country applications is desired.

Kenneth Bailes, EA, Question what segment of the work could be accomplished in 3 years, and what would be the impact of such work? Answer: this is an ongoing program with the need to develop workable applications in different areas. the 3 year period is essentially an agreed-upon period for review and control in the approval of ongoing research projects. Arthur Handly, PPC, asked what might be expected as a product in 3 years which we do not have now? Answer: this is a matter of time and the local economics needed to work out local cost-effective approaches. There is need to verify findings in other locations, models in 2 different climatic, socio-economic conditions. Replication is planned for Thailand (Guy Baird, TA/AGR). Why not focus on Bangladesh as a focal point of greatest need for food production? With an emphasis on aquatic weeds, why is this planned for Thailand? Fletcher E. Riggs (EA/TD) indicated this is not the case, the emphasis in Thailand will be on dryland crop weed control. Dr. Long observed that there is a need to be concerned in all projects with how to move the findings into areas where the needs are greatest.

**Motion: To approve the project. Moved and seconded.**

**Vote: Aye 4, Nay 1, motion approved.**

PROJECT SUMMARY

9310463 (12)  
FD-ADL-777  
2/2

Major Type of Activity: Key Problem Area - Developing LDC Research Capability

Project Title: Control of Weeds in LDCs

Contractor: Oregon State University

Contract Number: AID/csd-1442

Contract Coordinator: Dr. William R. Furtick  
Title: Director, International Plant Protection Center

Project Number: 130-463

Project Duration: Started 6/30/66 Termination Date 6/30/71

Budget: a) Funds obligated through FY 70 : \$1,013,508  
b) Funded for FY 71 : 369,000  
c) Funds requested for FY 72 : 378,000  
d) Estimated fund requirement FY 73: 550,000

TA/AGF Project Manager:  
Mr. Lawrence C. Kapp

TA/AGF Project Specialist:  
Mr. George D. Peterson, Jr.

Purpose: Weeds reduce crop production by competing with crops for available water, soil nutrients and sunlight, and by serving as hosts for important plant diseases, insect pests and plant parasite nematodes. Some of the new high-yielding varieties, in particular, require strict weed control in order to fully realize their production potential. The purpose of this project is to find simple, effective and economical methods of controlling weeds in the LDCs.

Description of Activity: With emphasis initially on Latin America, the contractor is to (1) identify weed problems by species, extent, distribution, existing control methods, problems of control and economic importance and (2) evaluate, through on-site inspection, research institutions in designated countries to determine adequacy of facilities and research capability. The contractor's staff members are responsible for initiating cooperative research and coordinating it through the A.I.D. country Missions, and for training local technicians in effective control methods and modern research procedures.

Accomplishments and Utilization: The initial research indicated that 90% of production loss was due to damage caused by weeds during the first 3 to 4 weeks of crop life. On the basis of this information, a research and extension program was launched with the result that Colombia, which had made only token use of pre-emergence herbicides, increased sales of chemical weed control materials to over 50% of the total of such material purchased in all of Latin America. The successful Colombia program established a prototype capable of expansion to other Latin and Central American countries. Weed control programs are now under way in Ecuador, El Salvador and Panama. A number of manuals and reports on weed problems and use of herbicides have

been produced. Publications on weeds have been produced for many Latin American countries and special reports have been prepared on research and problems encountered in project work in Turkey, Hawaii and other places. Research and assistance to date have increased crop productivity and reduced weed control costs. New materials are evaluated in Hawaii, at Oregon State and in the cooperating countries. Private enterprise has been stimulated to enter into weed control activities on farm lands, to contribute expertise, and to provide free-of-cost supplies of herbicides and weed control equipment for evaluation.

Future Plans: Extension and expansion of activities is anticipated in Central and Latin America; and expansion into East Asia for research on aquatic weeds is being explored. Due to the importance of rice, much work is needed on aquatic weeds in lowland rice areas.

9310463 (12)  
 PD-AAL-777

**COST REIMBURSEMENT CONTRACT WITH AN EDUCATIONAL INSTITUTION**

(2) *ph*

AGENCY FOR INTERNATIONAL DEVELOPMENT NEGOTIATED CONTRACT NO. AID ta-C-1295

NEGOTIATED PURSUANT TO THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED, AND EXECUTIVE ORDER 11223	TOTAL ESTIMATED CONTRACT COST \$734,230 (See Article VI) <span style="float: right;">18p</span>
CONTRACT FOR: Weed Control Systems for Representative Farms in Developing Countries	CONTRACTOR (Name and Address) Oregon State University
PROJECT NO. 931-17-130-463-73	NAME P. O. Box 1086
ISSUING OFFICE (Name and Address) Central Operations Division Office of Contract Management Agency for International Development Washington, D.C. 20523	STREET ADDRESS Corvallis, Oregon 97330
ADMINISTRATION BY CM/COD/TAB	CITY, STATE, AND ZIP CODE CORVALLIS, OREGON 97330
MAIL VOUCHERS (Original and 3 copies) TO: Office of Financial Management Agency for International Development Washington, D.C. 20523	COGNIZANT SCIENTIFIC/TECHNICAL OFFICE TA/AGR
EFFECTIVE DATE April 1, 1976	ACCOUNTING AND APPROPRIATION DATA PROJECT NO. 3167522 APPROPRIATION NO. 72-11x1023 ALLOTMENT NO. 402-31-099-00-22-51
	ESTIMATED COMPLETION DATE March 31, 1979

The United States of America, hereinafter called the Government, represented by the Contracting Officer executing this Contract, and the Contractor, an educational institution chartered by the State of Oregon with its principal office in Corvallis, agree that the Contractor shall perform all the services set forth in the attached Schedule, for the consideration stated therein. The rights and obligations of the parties to this contract shall be subject to and governed by the Schedule and the General Provisions. To the extent of any inconsistency between the Schedule and the General Provisions and any specifications or other provisions which are made a part of this contract, by reference or otherwise, the Schedule or the General Provisions shall control. To the extent of any inconsistency between the Schedule and the General Provisions, the Schedule shall control.

This Contract consists of this Cover Page, the Table of Contents, and the Schedule consisting of 15 pages, the General Provisions (Form AID 1420-23C), dated 7-1-75, Additional General Provisions (Form AID 1420-23D), dated 7-1-75 and Attachments A, B, and C.

NAME OF CONTRACTOR Oregon State University	UNITED STATES OF AMERICA AGENCY FOR INTERNATIONAL DEVELOPMENT
BY (Signature of authorized individual) <i>Hugh F. Jeffrey</i>	BY (Signature of Contracting Officer) <i>V.C. Perelli</i>
TYPED OR PRINTED NAME Hugh F. Jeffrey	TYPED OR PRINTED NAME V.C. Perelli
TITLE Director of Business Affairs	CONTRACTING OFFICER
DATE April 29, 1976	DATE MAY 20 1976

**SCHEDULE**  
**COST REIMBURSEMENT CONTRACT WITH**  
**AN EDUCATIONAL INSTITUTION**

**TABLE OF CONTENTS**  
**SCHEDULE**

The Schedule, on pages 1 through 15, consists of this Table of Contents and the following Articles:

- ARTICLE I - STATEMENT OF WORK
- ARTICLE II - KEY PERSONNEL
- ARTICLE III - CHANGES IN RESEARCH METHODS, PROCEDURES, OBJECTIVES, OR PHENOMENA UNDER STUDY
- ARTICLE IV - LEVEL OF EFFORT (ILLUSTRATIVE)
- ARTICLE V - PERIOD OF CONTRACT SERVICES
- ARTICLE VI - ESTIMATED CONTRACT COST AND FINANCING
- ARTICLE VII - BUDGET
- ARTICLE VIII - NEGOTIATED OVERHEAD RATES
- ARTICLE IX - THIRD COUNTRY AND COOPERATING COUNTRY NATIONALS
- ARTICLE X - SPECIAL PROVISION
- ARTICLE XI - ALTERATIONS IN CONTRACT

GENERAL PROVISIONS

The General Provisions applicable to this contract consist of form AID 1420-23C entitled "General Provisions - Cost Reimbursement Contract with an Educational Institution," dated 7-1-75, which includes provisions 1 through 40, and form 1420-23D entitled "Additional General Provisions - Cost Reimbursement Contract with an Educational Institution," dated 7-1-75, which includes provisions 1 through 18.

## ARTICLE I. STATEMENT OF WORK

For the period as hereinafter set forth in the Schedule, the Contractor shall make available and employ its research and development facilities and personnel to study and identify optimal weed control technologies applicable to non-commercial size farms in developing countries and their relationship to other societal goals.

### A. Objectives

The purpose of this contract is to continue the research effort previously conducted under Contract No. AID/CM/ta-C-73-23. The principal objective of this research is to develop weed control systems for representative farms in developing countries. Contractor's research shall include the following:

1. Identification of the optimal weed control technologies for representative small and medium-size farms in selected developing countries of Southeast Asia and Latin America;
2. Evaluation of the socio-economic impacts of these technologies for the farm and associated labor pool and develop agro-economic models of the farm sector in the test areas;
3. Estimate of the efficiency trade-offs to achieve other societal goals, such as greater rural employment and more even distribution of income.

### B. Plan of Work

1. Southeast Asia Activity, Thailand. (April 1, 1976 to March 31, 1977
  - a. Observe and catalog soil, climate, cropping practices, weed problems and present weed control practices.
  - b. Establish linkages with local and international research

organizations (Royal Thai Government, IRRI, BIOTROP, ICAP).

c. Establish research priorities on weed control with host government officials; develop agreement pertaining to counterparts, facilities, and logistic support.

d. Identify research area.

e. Review agronomic, economic and sociological literature pertaining to the research area.

f. Identify crops to be studied.

g. Determine needs for economic studies of farm operations and labor force.

h. Develop definitive work plans for the first and second crop years based on above findings.

2. Central America, Costa Rica. (April 1, 1976 to March 31, 1977.)

First year activities will parallel Southeast Asia activities but will be centered at Turrialba, Costa Rica, and primary linkages will be with the Government of Costa Rica, ROCAP, CATIE, CIAT and ALAM.

3. On Campus

The support staff at the home campus will:

a. Provide administrative and logistic support to field staff.

b. Coordinate inputs from OSU Departments (Agronomic Crop Science, Agricultural and Resource Economics).

c. Maintain liaison with AID/W and U.S. and international research organizations.

d. Provide guidance on project activities design to insure accommodation for socio-economic studies.

e. Design, pre-test, evaluate questionnaires for socio-

economic studies.

f. Evaluate field results.

g. Provide editorial and publication assistance.

4. Future project activities, April 1, 1977 to March 31, 1979.

a. Field Activities, Southeast Asia and Central America (1977-78).

(1). Establish research field trials at selected locations with at least five orientations of field trials:

(a) substitution between labor and capital

(b) herbicide selectivity

(c) interaction between inputs (fertilizer, seeding rate, weed control measures)

(d) comparison of weed control methods in relation to availability of labor

(e) comparison of integrated weed control systems, including combinations of manual, cultural, chemical and biological.

(2) Develop and pretest questionnaires and conduct surveys of farm and farm labor populations as required.

(3) Develop comparative cost data for alternative weed control systems by farm size.

(4) Fit production functions to field trial data to permit estimates of interaction relationships.

(5) Determine importance of weed control in the general farm context.

(6) Examine farm models used in Brazil for acceptability in Thailand/Costa Rica and modify as required.

b. Field activities, Southeast Asia and Central America

**(1978-79)**

- (1) Promising field trials to be refined and repeated.
- (2) Establish new experiments on promising lines of investigation.
- (3) Expand field trials to include additional crops and multiple cropping.
- (4) Resample farm and agricultural labor populations and modify survey, if required.
- (5) Make final specification of model.
- (6) Refine parameter and technical coefficients and incorporate into models.
- (7) Specify optimal weed control systems by farm size.
- (8) Relax efficiency criteria to determine income costs in attaining other social goals.
- (9) Prepare reports on project research.

c. **On-Campus (1977-79)**

Continue support of field work as indicated in 3. above.

**C. Reports**

Contractor shall submit reports in accordance with Attachment A hereto entitled "Agency for International Development Instructions and Guidelines for Preparation and Submission of Reports from Research Contractors."

**ARTICLE II. KEY PERSONNEL**

A. The key personnel which the Contractor shall furnish for the performance of this contract are as follows:

Key personnel: S. L. Miller, Principal Investigator

H. H. Fisher

M. D. Shenk

B. The personnel specified above are considered to be essential to the work being performed hereunder. Prior to making any change in the key personnel, the Contractor shall notify the Contracting Officer reasonably in advance and shall submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on the program. The listing of key personnel may, with the consent of the contracting parties, be amended from time to time during the course of the contract to either add or delete personnel, as appropriate.

C. 1. The Contractor shall obtain A.I.D.'s approval to change the principal investigator or project leader, or to continue the research work during a continuous period in excess of three months without the participation of the approved principal investigator or project leader.

2. The Contractor shall consult with A.I.D. if the principal investigator plans to, or becomes aware that he will, devote substantially less effort to the work than anticipated. If A.I.D. determines that the reduction of effort would be so substantial as to impair the successful prosecution of the research, A.I.D. may request a change of principal investigator, terminate the research effort or make any other appropriate modification of the research agreement.

ARTICLE III. CHANGES IN RESEARCH METHODS, PROCEDURES, OBJECTIVES OR PHENOMENA UNDER STUDY

-- A. The principal investigator may change the methods and procedures employed in performing the research without making special reports on proposed actions or obtaining A.I.D. approval. However, significant changes in methods or procedures shall be reported to the Government in periodic or final technical reports. In the event the methodology or experiment is stated as a specific objective of the research work, any

changes to either fall within the scope of paragraph B. below.

B. The stated objectives of the research effort shall not be changed, except with the prior approval of the Contracting Officer.

C. The phenomenon or phenomena under study, i.e., the broad category of research, shall not be changed except with the prior approval of the Contracting Officer.

#### ARTICLE IV. LEVEL OF EFFORT (ILLUSTRATIVE)

A. During the period April 1, 1976 through March 31, 1979, the estimated level of effort for the performance of the contract shall be 180.6 worker-months of direct labor.

B. The estimated composition of the total worker-months of direct labor is as follows:

	<u>Worker-Months</u>
Professionals	144.6
Non-Professionals	36.0

#### ARTICLE V. PERIOD OF CONTRACT SERVICES

The effective date of this Contract is April 1, 1976 and the estimated completion date of work, including final report(s), under this Contract is March 31, 1979.

#### ARTICLE VI. ESTIMATED CONTRACT COST AND FINANCING

The Contractor will be reimbursed for the costs incurred by him in performing services hereunder in accordance with the applicable provisions of the Schedule and the General Provisions, subject to the following limitation made in respect thereto:

A. Total A.I.D. dollar funds available for payment and allotted to this Contract. See the clause of the General Provisions entitled "Limitation of Funds" and the article of the Schedule entitled "Budget," if applicable. \$ 240,000

B. Estimated additional funds which may be provided, if funds are available. See the clause of the General Provisions entitled "Limitation of Funds" and the article of the Schedule entitled "Budget," if applicable. \$ 494,280

Total Estimated Contract Cost \$ 734,280

NOTE: It is estimated that the aforesaid amounts will be sufficient to complete the work required hereunder as set forth in the Schedule article entitled "Statement of Work."

## ARTICLE VII. BUDGET

<u>Line Item No.</u>	<u>Funds Available</u> <u>(i.e., Obligated)</u>	<u>Estimated Additional Cost</u> <u>to Completion</u>	<u>Total Estimated</u> <u>Contract Cost</u>
	FROM: 4-1-76 TO: 3-31-77	FROM: 4-1-77 TO: 3-1-79	
1. Salaries & Wages	\$ 96,215	\$229,623	\$325,838
2. Indirect Costs (Overhead)	37,280	88,310	125,590
3. Fringe Benefits	15,394	36,740	52,134
4. Allowances	17,690	33,292	50,982
5. Travel & Transportation	48,511	87,987	136,498
6. Equipment, Supplies, Materials & Vehicles	22,473	12,698	35,171
7. Other Direct Costs	<u>2,437</u>	<u>5,630</u>	<u>8,067</u>
GRAND TOTAL	\$240,000	\$494,280	\$734,280

The "Funds Available" column represents the total funds authorized to be expended by the Contractor during the period indicated (see the Article of the Schedule entitled "Estimated Contract Cost and Financing" and the clause of the General Provisions entitled "Limitation of Funds."). Total contract expenditures shall not exceed the grand total of the funds available. Within the grand total, the Contractor may adjust Line Item amounts as reasonably necessary for the performance of the work.

The Contractor also agrees to furnish data which the Contracting Officer may request on costs expended or accrued under the Contract in support of the budget information provided herein.

The allowable cost of performance of this Contract shall include all allowable and allocable costs which have been incurred by the Contractor in anticipation of this Contract on and after April 1, 1976, but prior to

the execution date hereof and which if incurred after the date of this Contract would have been considered as items of allowable and allocable costs under this contract, provided however, that such pre-contract costs shall not exceed \$10,000 unless such amount is subsequently increased in writing by the Contracting Officer.

ARTICLE VIII. NEGOTIATED OVERHEAD RATES

A. Establishment of Predetermined Indirect Cost Rates

Pursuant to the provisions of the clause of the General Provisions of this Contract entitled "Negotiated Overhead Rates - Predetermined," a rate or rates shall be established for each of the Contractor's accounting periods during the term of the Contract (see the Article of the Schedule entitled "Estimated Contract Cost and Financing" and the clause of the General Provisions entitled "Limitation of Funds"). The rate for the initial period shall be as set forth below:

	<u>Rate</u>	<u>Base</u>	<u>Period</u>
On Campus	45.22%	*Salaries & Wages	From: 4-1-76 To: 6-30-76
Off Campus	33.11%	Salaries & Wages	From: 4-1-76 To: 6-30-76

Predetermined indirect cost rates for subsequent periods shall be established in accordance with the terms of the "Negotiated Overhead Rates - Predetermined" clause of this Contract.

\*Including vacation, holiday and sick pay, but excluding other fringe benefits.

ARTICLE IX. THIRD COUNTRY AND COOPERATING COUNTRY NATIONALS

Contractor is authorized to use third country or Cooperating Country nationals under the contract. Salaries and wages paid to such persons may not, without specific written approval of the Contracting Officer, exceed either the Contractor's established policy and practice; or the level

of salaries paid to equivalent personnel by the A.I.D. Mission in the Cooperating Country; or the prevailing rates in the Cooperating Country, as determined by A.I.D., paid to personnel of equivalent technical competence.

ARTICLE X. SPECIAL PROVISION

Prior to making any visits to LDCs, the contractor will review his plans with TA/AGR. He will keep AID Missions in countries to be visited fully informed of proposed visits, ask them to provide any advice they wish regarding timing and content of the visits and to participate if they desire, and will inform the Missions of the outcomes of consultations. He will make his own appointments and logistics arrangements directly. Upon completion of any project funded travel, a copy of the trip report will be provided to the TA/AGR project manager. The report format will be established jointly by the contractor and the project manager.

ARTICLE XI. ALTERATIONS IN CONTRACT

The following modifications are made to the General Provisions and Additional General Provisions of this Contract:

A. General Provision No. 7 - "Allowable Cost and Payment" - Delete in its entirety and in lieu thereof substitute the following:

"7. Allowable Cost and Payment (September 1975)

(a) For the performance of this contract, the Government shall pay to the Contractor the cost thereof (hereinafter referred to as "allowable cost") determined by the Contracting Officer to be allowable in accordance with:

(1) Subpart 1-15.3 of the Federal Procurement Regulations, "Grants and Contracts with Educational Institutions" as in effect on the date of this contract, and

(2) The terms of this contract

(b) Dollar payment:

(1) At least once each quarter the Contractor shall submit to the paying office indicated on the Cover Page, a Voucher Form SF-1034 (original) and SF-1034(a) in three copies. Each voucher shall be identified by the appropriate AID contract number, properly executed, in the amount of dollar expenditures made during the period covered. The voucher forms shall be supported by:

(i) Original and three copies of a certified fiscal report rendered by the Contractor in a form and manner satisfactory to AID substantially as follows:

<u>Total expenditures</u>			
<u>Category</u>	<u>Budget Amount</u>	<u>To date</u>	<u>This period (indicate dates)</u>
<b>Salaries and wages:</b>			
On campus.....	\$xxx	\$xxx	\$xxx
Off Campus.....	xxx	xxx	xxx
<b>Indirect costs:</b>			
On campus.....	xxx	xxx	xxx
Off campus.....	xxx	xxx	xxx
Consultant fees.....	xxx	xxx	xxx
Allowances.....	xxx	xxx	xxx
Travel and transportation.....	xxx	xxx	xxx
Equipment and materials	xxx	xxx	xxx
Participant costs....	xxx	xxx	xxx
Other direct costs...	<u>xxx</u>	<u>xxx</u>	<u>xxx</u>
<b>Grand Total.....</b>	<b>\$xxx</b>	<b>\$xxx</b>	<b>\$xxx</b>

(ii) The fiscal report shall include a certification signed by an authorized representative of the Contractor as follows:

The undersigned hereby certifies: (A) That payment of the sum claimed under the cited contract is proper and due and that appropriate refund to AID will be made promptly upon request in the event of disallowance of costs not reimbursable under the terms of the contract, and (B) that information on the fiscal report is correct and such detailed supporting information as AID may reasonably require will be furnished promptly to AID on request at the Contractor's home office or base office as appropriate.

BY \_\_\_\_\_

TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

(iii) Unless otherwise provided in the contract, a vendor's invoice or photostat covering each transaction for procurement of commodities, supplies, or equipment totalling in excess of \$2,500 appropriately detailed as to quantity, description, and price for each individual item of equipment purchased.

(iv) The bill of lading or airway bill as evidence of shipment by U.S.-flag carrier.

(2) Promptly after receipt of each voucher and statement of dollar cost, the Government shall, except as otherwise provided in this contract, subject to the provisions of paragraph (d) of this section make payment as approved by the paying office indicated on the Cover Page.

(3) The final voucher shall be submitted by the Contractor promptly following completion of the work under this contract, but in no event later than 120 days (or such longer period as the Contracting Officer may in his/her discretion approve in writing) from the date of such completion. This voucher, clearly identified as final voucher, shall be submitted on Form SF-1034 (original) and SF-1034 (a) in three copies and supported by:

(i) Original and three copies of a certified fiscal report rendered by the Contractor as in paragraphs (b)(1)(i) and (ii) of this section;

(ii) Vendor's invoices as in paragraph (b)(1)(iii) of this section for commodities, supplies, or equipment in excess of \$2,500 procured since the last voucher submission;

(iii) Bill of lading or airway bill as in paragraph (b)(1)(iv) of this section;

(iv) Refund check for the balance of funds (if any remaining on hand and not obligated by the Contractor).

~~(c) Local currency payment.~~ The Contractor is fully responsible for the proper expenditure and control of local currency, if any, provided under this contract. Local currency will be provided to the Contractor in accordance with written instructions provided by the Mission Director. The written instructions will also include accounting, vouchering, and reporting procedures. A copy of the instructions shall be provided to the Contractor's Chief of Party and to the Contracting Officer. The costs of bonding personnel responsible for local currency are reimbursable under the contract.

(d) Until the expiration of three years after final dollar or local currency payment under this contract, the Contracting Officer may have the vouchers and statements of cost audited. Each payment theretofore made shall be subject to reduction for amounts included in the related voucher which are found by the Contracting Officer, on the basis of such audit, not to constitute allowable cost. Any payment may be reduced for overpayments, or increased for underpayments, on preceding vouchers.

**NOTE:** When the clause entitled "Audit" (FPR 1-3.814-2(a)) is included in this contract, this paragraph is self-deleting.

(e) Upon compliance by the Contractor with all the provisions of this contract, acceptance by the Government of the work and final report, and a satisfactory accounting by the Contractor of all Government-owned property for which the Contractor had custodial responsibility, the Government shall promptly pay to the Contractor any moneys (dollars or local currency) due under the final voucher. The Government will make suitable reduction for any disallowance or indebtedness by the Contractor by applying the proceeds of the voucher first to such deductions and next to any unliquidated balance of advance remaining under the contract.

(f) The Contractor agrees that all approvals of the Mission Director and the Contracting Officer which are required by the provisions of this contract shall be preserved and made available as part of the Contractor's records which are required to be preserved and made available by the clauses of this contract entitled "Examination of Records by the Comptroller General and "Audit."

(g) The Contractor agrees that any dollar or local currency refunds, rebates, credits, or other amounts (including any interest thereon) accruing to or received by the Contractor or any assignee under this contract shall be paid by the Contractor to the Government, to the extent that they are properly allocable to cost for which the Contractor has been reimbursed by the Government under this contract. Reasonable expenses incurred by the Contractor for the purpose of securing such refunds, rebates, credits, or other amounts shall be allowable costs hereunder when approved by the Contracting Officer. Prior to final payment under this contract, the Contractor and each assignee under this contract whose assignment is in effect at the time of final payment under this contract shall execute and deliver an assignment and release using AID Forms 1420-40 or 1420-44, as appropriate, as required in AIDPR 7-16.851."

**B. General Provision No. 8 - "Negotiated Overhead Rate" -**

"...is hereby amended to change the date in the title from "June 1973" to "September 1975", revise the parenthetical in paragraph (c) to read "(Grants and Contracts with Educational Institutions)", and revise paragraph (c) as follows:

"(c) Allowability of costs and acceptability of cost allocation methods shall be determined in accordance with the provisions of Subpart 1-15.3 (Grants and Contracts with Educational Institutions) of the Federal Procurement Regulations as in effect on the date of this contract."

**C. General Provision No. 14 - "Training of Foreign Country Nationals"**

- is hereby amended to change the date in the title from "June 1973"

to "September 1975" and to substitute "Handbook" for "Manual Orders" in paragraph (a)(4).

D. Add General Provision No. 39 entitled "Clean Air and Water" which is attached hereto (Attachment B) and made a part hereof.

E. Add General Provision No. 40 entitled "Patent Rights - Retention by the Contractor" which is attached hereto (Attachment C) and made a part hereof.

F. Additional General Provisions No. 3 - "Personnel" is hereby amended to change the date in the title from "November 1973" to "September 1975" and to revise paragraph (d)(3) to read as follows:

"(d)

(3) The Contractor is encouraged to establish its own policy of pre- and post-tour medical examinations. As a contribution, AID shall reimburse the Contractor for physical examinations authorized in paragraphs (d)(1) and (2) of this section as follows:

(i) For the employee and dependents 12 years of age and over: not to exceed \$85 for the physical examination plus reimbursement of charges for immunizations.

(ii) For dependents under 12 years of age: Not to exceed \$25 for each child plus reimbursement of charges for immunizations."

G. In accordance with paragraph (a) of Additional General Provision No. 3, entitled "Personnel," whereunder the Contractor may not send individuals outside of the United States to perform work under the contract without the prior written approval of the Contracting Officer, the Contracting Officer does, hereby, provide said approval for those individuals required to travel outside the United States; provided however, that concurrence with the assignment and/or travel of any and all said individuals outside the United States is obtained, in writing, from the Cognizant Technical Office of A.I.D. prior to their assignment and/or travel abroad.

After approval of the proposed international travel, the Contractor shall provide the cognizant USAID mission advance notification, with a copy to the Contracting Officer, of the arrival date and flight identifications of AID financed travellers.

This approval by the Contracting Officer, shall not apply to any other clause or provision of this Contract which specifically requires Contracting Officer approval.

H. Additional General Provision No. 4 - "Personnel Compensation" - delete in its entirety and in lieu thereof substitute the following:

"Personnel Compensation (January 1976).

(a) Overseas recruitment incentive.

(1) Contractor employees serving overseas under this contract who do not qualify, request, and receive an exemption for overseas income provided under Section 911 of the U.S. Internal Revenue Code (26 U.S.C. 911) are eligible to receive an overseas recruitment incentive, provided that the average incentive for all such employees does not exceed 10 percent of the initial base annual salary of all employees

eligible, for the incentive under this contract.

(2) The overseas recruitment incentive is payable under one of the following alternative methods:

(1) As a lump-sum amount after the eligible employee has completed his tour of duty in the Cooperating Country under this contract, and has furnished to the Contractor a Certification that he does not qualify, and will not apply for an exemption from overseas income as provided by 26 U.S.C. 911 (Contractor shall retain such Certifications for post-audit); or

(11) At the option of the Contractor, the overseas recruitment incentive may be paid in increments during an employee's tour of duty; provided however, that payments made by the Contractor to employees who become eligible for an exemption from overseas income as provided by 26 U.S.C. 911, which payments were reimbursed by AID under this contract, shall be refunded to AID; and provided further, that neither the Contractor' (nor the Subcontractor's) inability to collect refunds from ineligible employees shall be used as a basis to excuse subsequent refunds by the Contractor to AID.

(3) If the overseas recruitment incentive causes the employee's salary to exceed the FSR-1 level, Contracting Officer approval must be obtained."

related to OST  
project

**SUMMARY PROGRESS STATEMENT  
ONGOING PROJECTS**

**Project No:** 931-17-130-463

**Project Title:** Weed Control Systems for Representative Farms in Developing Countries

**Contractor:** Oregon State University

**I. Implementation Progress** PAR completed and new project proposal received from OSU, New Project Statement in preparation.

<u>Outputs</u>	<u>Progress to Date &amp; Relationship to Project Purpose and Goal</u>
1. Small farm weed problems identified.	1. Weed Manuals for identification and weed research technology published and distributed.
2. Developed economic methods to solve weed problems.	2. Technology transfer effected to LDCs and major institutions.
3. Initiated weed control programs in selected countries.	3. Technicians received in-service and/or academic training. Numerous seminars, short courses & field days conducted; program established in 7 countries of LA; 3 inst. added weed science into curriculum.
4. Improved information and utilization services.	4. Numerous publications, bulletins, info-letters and handbooks distributed.
5. Socio-economic methodology developed to determine effects of new technology.	5. Results of Socio-Economic studies in Brazil and El Salvador received.

**II. Project on Schedule; Life-of-Project Budget Accurate?**

The project is on schedule and new project proposal under consideration for a 3-year extension.

**III. Significant Change(s) in Project Proposed?**

Possible change from Research to GTS project. New geographic areas envisioned.

**IV. Role of TA Technical Office: Man days required**

Approximately 52 man days per year.

**Attachment:** PAR dated April 3, 1975

UNITED STATES GOVERNMENT

# Memorandum

9310763 (14)  
PO-AL-777

TO : See Distribution

DATE: October 3, 1973

FROM : TA/AGR, Channing J. Fredrickson *CF*

*24p*

SUBJECT: Meeting to discuss Weed Research Project AID/CM/TA-C-73-23  
regarding Northeast Brazil

Dr. Stanley Miller, Project Director for the Oregon State University AID contract will be in Washington October 5th to discuss specifically the various aspects of the project relating to the new demension of the goals and the letter of September 14, 1973 from Myron Shenk to Miller.

Room 2884 has been reserved for 2:00 P.M. on October 5th, 1973.

### Distribution

TA/AGR, M. Galli  
" G. Baird  
" J. Urano  
" W. Garman  
" D. Caton

AA/TA, E. Long  
LA/DR, C. VanHaeften  
TA/RUR, J. McDermott  
LA/BR, P. Schwab ✓

*Meeting  
cancelled  
10/5  
apd*



**SEP 21 1973**

**September 14, 1973**

**Dr. Stanley F. Miller, Director  
International Plant Protection Center  
Gilmore Anner  
Oregon State University  
Corvallis, Oregon 97331**

**Dear Stan:**

**In a letter earlier this week I mentioned the fact that the definition of a work zone for the socio-economic aspects of our project is going to be very crucial and difficult in view of the lack of the homogenous setting which is so frequently projected of the Northeast. That is to say, at this point it appears that any representative area we chose to work in will include nearly as many "large units" as "subsistence farms," according to the definition which I perceive floating around in the Washington meeting last January.**

**I am getting the impression that what Brazil needs and expects from our program is quite different from what was envisioned in D.C. For example, last week I spent three days traveling in the State of Paraiba, specifically on the IPEANE station at Alagoinha. There is such a shortage of hand labor in this area that they are paying nearly 20% above the minimum wage for laborers on the station, and are using a power tiller. Furthermore, manual control in pasture as well as field crops is very expensive because of the need for frequent repetition. This area is dedicated to sugar cane in large measure, with vast acreages abandoned to a few cattle. The pastures are so overgrown with undesirable plants that the carrying capacity must be less than ten percent of its potential.**

**Leaders at this station, which is in the transition zone of the "mata-agreste," maintain that further inland the labor supply is in greater scarcity since the conditions are so severe that larger members of the labor force have left the zone. They maintain that the "salvation" of this large area will be achieved only through the introduction of modern technology. The FAO man I traveled with tends to agree.**

**Dr. Stanley F. Miller**

Today, Herb Fisher and I visited with the Head of Agronomic Research for the State Research Institute of Pernambuco (IPA). He stated that many areas of Pernambuco are experiencing short labor supplies. Furthermore, Cyperus Rotundus (nutsedge) is so serious in many areas that crop production is being hindered. In the more humid areas the more they employ manual control methods the faster this species spreads. (We know this is true since each time a rhizome is severed apical dominance is removed and new sprouts form, increasing the plant population greatly.) He ascertained that modern techniques must be introduced if Pernambuco is going to forward in agricultural productivity.

Dr. Paulo Sá R. Campos (USAID/Recife) has data showing that more than 60% of production costs in pineapple are for hand weeding. This is quite significant since pineapple is raised extensively by small growers, in many areas. In fact, Dr. Sá argues that if modern technology were available for the small growers they could probably double their acreage as well as increase production per unit area.

It is interesting to note that the State Extension Service (ANCARPE) has established 10 hectares as the minimum sized farm they will work with. The Wisconsin team will be working quite closely with some ANCARPE projects. Our linkage with the Wisconsin program continues to be very good. The national program against droughts (DNOCS) seems to have some of the best technical extension activities of any national entity. After they develop a water supply for a small area (wells or dams) they promote intensive production on small plots. We could probably generate some very good responses and valuable data on these "technified farms," but they would be far from "representative of the Northeast."

One other possibility for a project work area are the colonies, established under the land reform program. Again, these are not "representative farmer" but we could be assured of cooperation and a productive program.

Dr. Sá has suggested that in view of existing infrastructures we should consider working with IPEANE on industrial fruits (esp. Pineapple) and mandioca; DNOCS on basic food crops; and with private ranchers in pastures. I believe Dr. Sá is one of the most knowledgeable men in all of Brazil in regards to the actual situation of the Northeast.

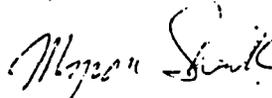
**Dr. Stanley F. Miller**

**The concept of a representative farm needs to be looked at carefully. We are all aware of the great concentration of development programs in the NE. Dr. Sá contends that the future production of the NE will center around such programs as DNOCS and ANCARPE. Therefore, if we go into the hinterlands and initiate a research program for five or six year on what most Ivy Leaguers consider "representative farms" we will have a report which will be of little value or relevance.**

**A cursory reading of this report might lead one to conclude that I plan to suggest that we request permission from Washington to embark on a program of pure agronomic production. That would be much simpler and probably more beneficial to Brazil, but I am not suggesting that we take an easy out, nor that our project is impractical as it stands. I do believe that the change in the world food supply which we have seen in the past six months does make our program look quite esoteric in the eyes of many people and the "textbook analysis" of this area has been overdone, what is needed immediately is technical assistance! By the way, we have been assigned four counterparts. Herb and I met with two of them today and are quite pleased with them. We are about to initiate a couple preliminary field trials this week.**

**Looking forward to your visit, I remain,**

**Fraternally,**



**Myron Shenk**

cc: Dr. Phau Fredrickson ✓  
Dr. Paulo Sá  
Larry Abel

931-463(?)  
AU

TIME-PHASED WORK PLAN  
WEED CONTROL SYSTEMS FOR REPRESENTATIVE FARMS  
IN DEVELOPING COUNTRIES

USAID/OSU WEED CONTROL PROJECT, AID/CM/ta-C-73-23

**Preface**

The AID-supported Oregon State University research project has as its major objective the reduction of food crop losses due to weeds in tropical countries. The project is designed to develop new weed control technologies and evaluate these in terms of such multiple goals as improved labor utilization, more equitable income distribution and economic efficiency.

For clarity and ease of discussion, the work plan will be divided into four sections:

- I. Northeast Brazil
- II. Central America
- III. Corvallis-based Staff
- IV. General Analytical Design of Socio-Economic Studies

However, in actual practice all of these phases will be integrated into one coordinated effort.

## I. NORTHEAST BRAZIL

The work plan time period is from March 1973 through June 1976 and is divided into four sections:

A. March 1973 through December 1973 - a period of preparation in which the agronomists will locate in Recife, Pernambuco, Brazil and initiate activities to identify and characterize the agronomic, economic and social aspects of the farm community and the agricultural labor force.

B. January 1974 through December 1974 - the first crop year.

C. January 1975 through December 1975 - the second crop year.

These two crop years will be utilized in generating, collecting, processing and evaluating data to achieve project goals.

D. January 1976 through June 1976 - the last period will be used to finalize the evaluation of such data and to publish results.

Attainment of project goals within the approved contract period, March 1, 1973 through December 31, 1975, will be impossible because 1975 crop year's harvest season extends late into the calendar year. Sufficient processing and integration of all data and the compilation of a report on research conducted to date (late 1975) will necessitate a project extension until June 1976.

The work to be accomplished during the 1974 and 1975 crop seasons will concentrate on what we believe to be the most critical issues. Undoubtedly on-site experience will give rise to research needs which have not been anticipated and cannot be adequately assessed

within the time period of this contract. A subsequent decision will be made after these two years as to whether the program should be terminated at that date or whether an extension of the contract should be made.

1. 1973 (March through December)
  1. identify, secure and ship needed equipment
  2. study research site and make initial contacts 1/
  3. two agronomists arrive and establish; ETA July
  4. one agricultural economist arrive and establish. ETA unknown at this point, pending further developments in staffing.
  5. contact personnel of USAID, Ministry of Agriculture, IPEANE, other institutions, industry, etc.
  6. establish linkages with other Brazilian and international research organizations as necessary
  7. obtain counterparts, secretary, physical facilities and other logistic support
  8. review pertinent agronomic, economic and social literature and secondary data
  9. observe and catalog soil, climate, cropping practices, weed

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1/ The agronomist, Fisher, will make an on-site study of the research area late April-early May to facilitate later arrival of both agronomists, Shenk and Fisher. The purposes of the trip are to: alert USAID, Ministry of Agriculture and U.S. Consulate officials of arrival, arrange for importation of equipment, identify cooperators, secure facilities and counterparts, survey weed problems, review research literature and statistics on state of Pernambuco, etc.

problems of major food crops and noncrop areas such as irrigation channels, roadsides, etc., and existing weed control techniques

10. specify project research areas
  11. determine crops to be studied
  12. identify and plan field trials
  13. enumerate farm populations and stratify by farm size
  14. identify agricultural labor force
  15. develop and pretest farm questionnaires
  16. develop and pretest agricultural labor force questionnaires
  17. locate cooperators for field locations
- B. 1974 (January through December)
1. establish field trials at several predetermined locations to study:
    - a. yield losses due to weed competition
    - b. optimal time(s) and techniques of mechanical and manual weeding (critical period(s) of weed competition)
    - c. herbicide selectivity
    - d. crop density, i.e., effects of increasing crop competition (towards weeds) by adjusting planting densities through inter- and intra-row spacing of plants
    - e. variety-fertility-competition interactions
    - f. integrated weed control including combinations of manual, cultural, chemical and biological methods
  2. conduct farm and labor surveys
  3. estimate cross-sectional production functions by farm size
  4. obtain preliminary estimates of substitution rates between capital

and labor employed in weed control

5. identify characteristics of the labor pool
  6. evaluate costs of alternative weed control methods
  7. initiate construction of generalized quantitative model to be used for the development of economically-efficient weed control systems and evaluation of alternative social goals
- C. 1975 (January through December)
1. select, refine and repeat promising 1974 field trials
  2. expand research into cultural practices such as continuous, multiple and inter-cropping; chemical and mechanical fallow, cover crops, tillage, and mulching
  3. install trials on crops not included in prior studies
  4. resample farm and labor populations to obtain characteristics over time as needed
  5. complete development of generalized quantitative model
  6. specify beginning parameters and technical coefficients of the model from field trials and farm and labor surveys
  7. generate initial estimates of optimal weed control systems by farm size
- D. 1976 (January through June)
1. evaluate and integrate project data
  2. refine parameters and technical coefficients of the model and generate final estimates of the optimal production systems by farm size
  3. relax the economic efficiency criterion to obtain alternative

social goals and estimate costs in terms of change in regional net farm incomes.

4. prepare and submit reports and publications on project research conducted to date

Research results generated within this project will be utilized not only in Brazil, but also in other developing nations possessing conditions similar to those of northeast Brazil. Within Brazil scientific papers will be presented at meetings such as The Brazilian Herbicide and Weed Society, seminars will be presented and several practical courses in weed control research methods will be organized. These short courses and other forms of utilization of research information can also be realized through cooperation with other weed research institutes throughout the world.

A number of project activities which have no definite schedule will be initiated and continued as required. These will probably include

training counterparts, increasing weed research capabilities of Brazilian institutions, developing new and economical weed control methods (and putting these into practice), preparing publications, acting as an information and back-up source for other USAID missions, preparing reports, consulting with Brazilian government agencies, attending scientific meetings in Brazil, in the U.S. and abroad, etc.

## II. CENTRAL AMERICA

### A. Broad Goals

1. Greater emphasis on the study of the socio-economic systems as influenced by the new technology of weed control. Methodology will be closely coordinated with the Agricultural Economist in Corvallis and exchange of results and data with the project in Brazil.
2. Integrated control of weeds will receive special attention to minimize the use of chemical weed-killers.
3. Effects of weed control procedures will reflect concern for the environment.

### B. Time-Phased Work Plan

1. April - December, 1973
  - a. Complete the editing, layout, proofreading and final printing of Weeds of Central America book. Copies will be distributed to all Agricultural Ministries in Central America assuring that each appropriate extension agent in each country receives a copy.
  - b. Complete the writing of weed control recommendation bulletins for sorghum, beans, corn, wheat, potatoes, and rice in Guatemala, Nicaragua, and Costa Rica. These recommendations are based on research already conducted by this project.
  - c. Conduct studies comparing integrated weed control methods using herbicide recommendations already developed by this project, alone and in combination with manual and cultural methods in beans, corn, sorghum, and rice. Economic comparisons of inputs and yields from each method will be made.

- d. Complete field trials and initiate preparation of recommendation bulletins for melons, citrus, peanuts, potatoes and tomatoes in El Salvador.
- e. Continue studies on relative competition from weeds under several weed control practices, especially in beans, corn, sorghum, and rice.
- f. Research will be initiated for weed control in pastures and in several horticultural crops such as peppers, carrots, cabbage, and others. These crops are grown in volume during the time when coffee, cotton, and sugar cane are being harvested, thus leaving little or no labor to plant and weed these crops. This activity is especially desired by the Ministries of Agriculture in Central America.
- g. Begin preliminary surveys to collect data to be used in socio-economic studies.
- h. Continue to help supervise and train counterparts throughout Central America.

January - December, 1974

- a. Complete the publication and distribution of recommendation bulletins for weed control in sorghum, beans, corn, wheat, potatoes, and rice in Guatemala, Nicaragua, and Costa Rica.
- b. Complete publication and distribution of recommendation bulletins for melons, citrus, peanuts, potatoes, and tomatoes in El Salvador.
- c. Intensify data collection for socio-economic studies--distribute questionnaires, review available statistics, etc.

- d. Continue evaluation of integrated weed control methods for pastures and several horticultural crops including economic evaluation of relative inputs and outputs in selected crops.
  - e. Continue to help supervise and train counterparts throughout Central America.
3. January - December, 1975
- a. Develop recommendation bulletins for certain of the horticultural crops and pastures in El Salvador.
  - b. Cooperate in analysis of data for socio-economic studies and help in collecting further data if required.
  - c. Continue economic evaluation of integrated control methods in certain horticultural crops.
  - d. Continue to help supervise and train counterparts throughout Central America. As the contract period nears termination, attempts will be made to assure that counterparts are in the best possible situation to carry on weed control efforts more or less independently.
4. January - June, 1976
- a. Evaluate and integrate project data.
  - b. Prepare and submit reports and publications on project research conducted to date.

### III. CORVALLIS-BASED STAFF

The primary justification for the Corvallis-based staff is to provide all possible support for the field staff, to keep the program running smoothly through liaison with AID Washington, and to help assure broad utilization of results from the field. General duties of each staff member are listed below. Specific activities might vary periodically depending on the needs of the program.

#### A. Project Leader

This position is to be assigned to the Home-Based Agricultural Economist who will devote one third of his time to administrative duties including the coordination of project inputs from the OSU Agronomic Crop Science and Agricultural Economics Departments' staff: budget management. He will have the primary responsibility for contacts with USAID and other national and international weed research organizations. The Project Leader will also maintain close liaison with the University of California AID Pest Management and Related Environmental Protection project.

#### B. Technical Support Agronomist

Primary functions of the Corvallis based agronomist is to provide technical and physical support for in-field agronomists. This will be accomplished through the following activities:

1. Keep field staff informed of current developments, trends, and activities in weed control by constant reviewing of literature and by travel to maintain contact with key U.S. and international weed control groups. A partial list of proposed travels is included in item 8.
2. Assist field staff in planning their activities by making periodic trips to Brazil and El Salvador.
3. Rewrite a weed control research guide which has been in constant demand but is out of print and needs revision.
4. Annually prepare a listing by crop of promising experimental herbicides.
5. Conduct three field trials annually to provide preliminary evaluation of experimental herbicides.
6. All the above activities provide a resource which allows Corvallis staff to respond to requests for weed control information by individuals from many areas of the world.
7. Supervise project technician who is responsible for ordering, designing, building, and shipping equipment and supplies needed by field staff.
8. Travel to meetings and contract countries as follows:
  - a. Third International Symposium on Tropical Root Crops, Ibadan, Nigeria - - - December 2-9, 1973.

Conference will be held at International Institute of Tropical Agriculture (IITA). This will provide an opportunity to exchange information with Dr. Keith Moody who does the weed control research at IITA.

- b. Two or three trips will be made to Central America and Brazil during contract period. Actual dates will depend on needs and schedule of field agronomists.
- c. British Weed Control Conference, Brighton, England - - November, 1975.
- d. Annual Conference of Weed Science Society of America, Las Vegas, Nevada - - - February 12-14, 1974, Washington, D. C. - - - February 4-6, 1975.
- e. Annual Conference of Southern Weed Science Society, Atlanta, Georgia - - - January 22-24, 1974, Memphis, Tennessee - - - January 20-23, 1975.
- f. Hyacinth Control Society, New Orleans, Louisiana - - - July 15-18, 1973.
- g. Asian-Pacific Weed Science Society Conference, Japan, 1975.

### C. Project Technician

Primary function of the Corvallis based technician is to assist Corvallis staff in providing for all the needs of the field staff.

- 1. Order, design, build, and ship equipment and supplies for field staff.

2. Carry out day-to-day field activities involved with herbicide screening trials.
3. Assist in reviewing and organizing weed control literature.
4. Assist in preparation of visual aids through photography for use in overseas workshops, demonstrations, etc.

#### D. Information Specialist

The overall objective is to implement and insure broader and more rapid utilization of the information developed through research conducted by the USAID/OSU Weed Research Project, with an ultimate target of smaller farmers in developing countries. The following activities are designed to achieve this objective:

1. Work with and advise project staff on the publication and distribution of weed control research performed in Brazil and Central America.
2. Collect material, prepare and edit copy, layout, and expedite production of the IPPC INFOLETTER no less than quarterly, incorporating information concerning weed control research and related applicable topics; oversee distribution of INFOLETTER.
3. Assume responsibility for maintaining and refining a mailing list of weed researchers in developing (and other) countries worldwide, as well as USAID Missions, and other cooperating institutions and individuals.

4. Service information requests from project field staff, USAID Missions, and researchers in developing countries, coordinating response with other project support personnel, or as directed by them.
5. Work jointly with project staff in researching, editing, and publishing material aimed at fulfilling weed control research information needs in developing nations. Possibilities under consideration include: a revision of the Weed Research Methods Manual, currently out of supply, but still in demand judging from requests continuing to be received; either an expanded section of a revised weed research methods manual, or a separate publication focusing on manual/mechanical techniques and equipment for weed control; a revised edition of the Herbicide Use and Nomenclature Index; a publication dealing with integrated weed control methods; a leaflet on the importance and methods of seed cleaning (as a weed prevention technique).
6. Oversee continuing worldwide distribution of weed control research-related publications stored at OSU.
7. Act as liaison with OSU Public Information Office, mass media, and other channels as warranted and applicable.
8. Assist in the preparation of reports, both technical and periodic, and proposals.
9. Continue worldwide search for more information on weed control techniques, equipment (manual and mechanical), researchers, meetings, etc.

## **E. Fiscal-Translation Specialist**

**15**

The work for this office is varied and continuous, but would be difficult to fit into a dated work plan. It includes the following facets, among others:

### **1. Budgeting**

- a. Prepare budgets in consultation with the Director, for new proposals and extensions of existing contract, including salary computations.
- b. Coordinate project activities with University offices concerned, including department, OSU Experiment Station and Business Office.
- c. Report on budget balances to Contract Office.

### **2. Translation**

- . Translate orders and other letters from Spanish and Portuguese to English.
- . Prepare and/or supervise preparation of Spanish translations of speeches or reports.
- . Assist staff members with language problems such as arranging for language instruction, contacting possible tutors, finding suitable text books, or making contact with the Modern Language Department of the University.

### **3. Fiscal**

- a. Be responsible for preparing requisitions and keeping record of expenditures on Agency for International Development Contract account.
- b. Check monthly ledger statements from the Business Office.
- c. Report to the Business Office the classification of expenditures for monthly billing to AID Contract Office.

- d. Prepare requisitions to repay Revolving Funds of overseas projects, including translating invoices and figuring dollar equivalents of national currency.
- e. Deposit checks in bank for Revolving Fund reimbursements.
- f. Keep records of expenditures and report back to overseas project leaders.
- g. Make quarterly reports to Business Office on condition of Revolving Fund accounts.

#### 4. Publications

- a. Read copy and proofread materials to be published, including Annual Report, proposals and others.
- b. Record and deposit money from sales of publications.

#### General

- a. Be familiar with University procedures and details of Contract between OSU and AID in order to stay within guidelines laid down for expenditures and personnel, and advise project personnel accordingly.
- b. Assist with procedures for shipping materials, equipment and household goods, including arrangements with packing, storage and transportation companies.
- c. Prepare University appointment forms for academic and classified personnel according to University and Personnel Division rules.
- d. Interview prospective clerical employees.
- e. Prepare travel authorization requests for out-of-state and foreign travel in accordance with University requirements.

- f. Supervise travel arrangements for staff including scheduling, obtaining visas, etc.

**F. Agricultural Economist**

Two-thirds of the time of the Agricultural Economist will be devoted to the supervision and conduct of the socio-economic phases of this project. This will entail periodic trips to Latin America to consult with in-field staff and to collect data. The analytical design of the socio-economic component is described in Section IV immediately following.

**IV. GENERAL ANALYTICAL DESIGN OF  
SOCIO-ECONOMIC STUDIES**

Research relating to the socio-economic aspects of weed control under this project will be concentrated in northeastern Brazil with some supporting advisory services available as needed to project personnel located in Central America. Accordingly, the time-phased work plan presented below refers to the program in Brazil.

The objectives of the project are to (1) identify economically efficient and feasible methods of weed control for representative farms in the study area and (2) to evaluate the effects of alternative methods of weed control on the levels of agricultural production, income and labor employment in the study area. To meet these objectives a model of the agricultural (farm and labor force) economy of the area will be developed. The model will use data from secondary sources where available, with agronomic experiments conducted under this project and interviews with one selected farmer and labor force participants in the study area. One element of this model will consist of a number

of representative farm models differentiated by size, income level, asset values, input use, output levels, etc. Another element will involve specification of labor differentiated by such characteristics as education, skill levels, etc.

Each model farm will be structured to reflect prevailing resource (constraint) levels, production activities, and product-factor relationships of farms in the appropriate stratum in the study area. In addition, activities particularly weed control activities not currently prevailing in the area-- will be incorporated in the individual farm models. Such activities will be identified on the basis of agronomic research conducted under this project. From these models a determination of optimum production systems, particularly weed control systems, can be determined under varying conditions of product and factor prices and resource constraints for each class of farm. Consequently, it will be possible not only to identify optima under existing conditions but also the nature of changes in prices and/or constraints necessary to induce changes from prevailing practices to other specified alternatives. Of particular importance will be the effects of such changes on the levels and types of labor employment resulting from such price and/or constraint changes.

Area effects will be determined by weighting individual farm effects according to the importance of each farm type in the study area and aggregating. It is anticipated that the resulting aggregate model will permit one to identify not only the costs, if any, in terms of employment, income distribution, etc.

of attaining economically efficient production; but, conversely, the costs in terms of economic efficiency of achieving some other policy objectives such as a given level of labor employment.

The time frame anticipated for the conduct of this research effort is identified below.

A. 1973 (March through December):

1. identification and review of literature bearing upon the economic and social structure of the agricultural (farm and labor) sector of the study area;
2. enumeration and stratification by size and type of the farm population; identification of the relevant agricultural labor force in the area; development of appropriate farm and labor questionnaires sampling design and pretests of the questionnaires;
3. assist agronomists in identification and design of appropriate agronomic experiments.

B. 1974 (January through December)

1. conduct farm and labor surveys
2. construct model farm for each stratum on the basis of the data obtained through survey and secondary sources;
3. identify optional production systems for each model farm. These systems will reflect only the technological alternatives currently employed in the area;
4. assist agronomists in determining output response functions to alternative weed control practices under experimentation; initiate

**specification of alternative weed control activities to be incorporated in the individual farm models;**

**initiate development of the aggregate area model.**

**C. 1975 (January through December )**

- 1. resample as needed farm and labor populations to identify, to the extent possible, errors in the components of the models associated with time (e.g., the effects of weather on product-factor relationships);**
- 2. refinement of output response functions on the basis of additional experimental results;**
- 3. generate preliminary estimates of optimal weed control systems by farm size;**
- 4. complete specification of the aggregate model.**

**D. 1976 (January through June)**

- 1. finalize parameters of individual farm models on the basis of further agronomic investigations and generate final estimates of optimal production systems by farm size;**
- 2. determine area impacts of achieving economic efficiency on labor employment, income distribution and/or other socially relevant policy objectives;**
- 3. determine the costs in terms of agricultural production, farm income, etc., of implementing alternative policy objectives such as the level of employment, income redistribution, etc.**

BACKGROUND PAPER  
(Prepared by TA/AGR - 12/10/71)

*file in project*  
9310463 (15)  
10-ACL-777

18p

PROJECT STATEMENT

Project Title - Weed Control in the LDCs

Contractor - Oregon State University

Contract Number - AIL/csd 1442

Contract Coordinator - Dr. Lyall F. Taylor, Acting Director  
International Plant Protection Center  
Oregon State University  
Corvallis, Oregon 97331

Contract Period - July 01, 1966 to June 30, 1971  
Extended - July 01, 1971 to June 30, 1972 (with RAC Approval)

End of Present Funding - March 30, 1972

RIGC Review Date (Tentative) - February, 1972  
RAC Review Date (Tentative) - March, 1972

Project Specialist - Willard J. Garman

Project Manager - James A. Urano

A. General Background

The project was approved by the RAC at the March 31-April 1, 1966 meeting and was recommended for AID support. The project was assigned an initial duration of five years. The first phase of the project was to evaluate weed problems in the four world-wide regions, starting with Latin America and then Southeast Asia.

During the first year, four countries...Colombia, Peru, Argentina and El Salvador, were selected to be headquarters for regional weed control projects and arrangements were concluded with the Missions and local governments of each country. Of the four staff members, hired and trained as project leaders, only one reached his post in Colombia prior to the freeze on new assignments imposed by the AID/W ceilings. The other staff, after extended delays, were assigned to weed control positions by OSU contracts with the AID Missions in Turkey and Jordan.

With the lifting of the ceilings, Guadalupe Garcia was posted October 1969 in El Salvador to cover Central America. Myron Schenk was assigned to Guayaquil, Ecuador in May 1970 to cover the lowlands of Ecuador and Panama.

On the expressed interest of Asian-country Missions in weed control, a field review of the Asian countries was made in 1969. Prevalent weed problems, existing facilities and professional staff available for collaborative projects were reviewed with the Missions in the Philippines, South Vietnam, Thailand and Malaysia. A recommendation was made to AID to establish a three-man regional research and technical assistance center in Southeast Asia under the current contract.

This project is structured around research. Since it started, the goal has been to apply experience and expertise of staff and consultants to upgrading, and where necessary, creating institutional weed control research capability in less developed countries. Thus the objective is to be able to leave a country with its own capability for continuing a strong research program. However, research alone can not implement the desired results of improving agricultural production; it must be applied if benefits are to be realized. Therefore, a secondary important facet of the project has been to assist in seeing that weed control research is applied and utilized. This has been carried on by in-country extension agencies, who, as in the United States, depends on research workers for information and some technical assistance.

B. Statement of Project Objectives as Stated in the Contract

- A. Train local personnel in weed research and demonstration techniques.
- B. Identify weed problems of LDCs.
- C. Test known methods of weed control for effectiveness.
- D. Develop new methods and techniques of weed control.
- E. Determine economic feasibility of control methods.
- F. Increase weed research capabilities of local institutions.
- G. Act as a source for technical information and available back-up for other AID Missions.
- H. Evaluate host countries to apply new weed control methods.
- J. Specific activities have been assigned to research, institution-building and training programs:
  1. The first step in attacking the problem is to identify the economically-important weed species. The project devoted much time in preparation of weed identification which may be applicable to some extent in the four regions recognized by AID/W

2. Results of the applied research on weed control are published in manuals giving best recommendations for specific crops and environmental condition (geographical).
3. Field days to demonstrate weed control techniques to AID and herbicide companies personnel, government personnel, farmers associated with credit agencies and those small farmers interested in weed control methods.
4. Short courses to teach the fundamentals of weed control.
5. Impetus was given to the establishment of weed control societies in as many countries as possible. This will make the exchange of published materials and other materials more effective.
6. The importance of practicing weed control in relationship with the price of herbicides and price of crops produced under local conditions, labor availability and seasonal variations.

#### C. Continued Relevance of Objectives

1. Some five million acres of potentially fine grazing land on the pampas of Argentina and Uruguay have been rendered unfit for livestock raising by the Castilian thistle.
2. About two million acres in Chile have been spoiled for pasture crops by several species of blackberry. Another million acres of fertile bottom land in Central Chile have been completely taken over by a poisonous legume called Galega officinalis.
3. Various species of nutsedges proliferate in all tropical areas and represent a major constraint on crop production.
4. Annual grasses of the genus Echinochloa plague rice farmers and reduce yield in most tropical regions.
5. In Brazil and Colombia particularly, but in other Latin American countries also, poisonous weeds which are palatable to livestock take a heavy toll of cattle.
6. Aquatic weeds clog irrigation canals and drainage ditches, cutting efficiency from fifty to ninety percent. They hamper crop production, river navigation and fish production. Some, like water hyacinth and water lettuce, multiply so rapidly that they can jeopardize the operation of massive flood control and power development projects.

In 1967 it was estimated that Colombian crops losses from weeds totaled about 310 million dollars under the prevailing ineffective control methods, mostly manual. Field weeding cost about 150 million dollars; thus, in a single year, weeds cost Colombia about a half billion dollars.

Clearly, Colombia's economy stood to gain from a program which would demonstrate the practical benefits of scientific weed control to farmers, ranchers and industry.

#### D. Progress to Date

In drafting the grand strategy for an all-out offensive on weeds in the underdeveloped world, the project leader and his co-workers soon discovered that numerous temperate zone control practices were unsuitable for tropical agriculture. Each country or ecological zone had its special weed problems for which special solutions had to be tailored.

It was decided to proceed by training local technicians in weed research techniques, with the aim of creating a pool of well-trained local specialists so that the project could ultimately phase out and move on to another region. OSU's American staffers would work in close liaison with personnel from local research institutions, universities, industries, and government agencies; after training the locals, the Americans would then help to develop effective programs in weed control involving the personnel trained.

Ultimately, the goal was translation of the research-developed data into practical recommendations for adoption by farmers in cutting weed damage and improving crop yields.

Research disclosed that most of the damage caused by weeds occurred in the first three or four weeks after crop planting, when the seedlings were especially vulnerable. Colombian farmers, it was found, usually put off weeding until the fourth week after planting; by then, the weeds had grown large enough to be easily grasped by the fingers and uprooted. But by then 90 percent of the harm to the young crops already had been done.

The OSU specialists prescribed a remedy: pre-emergence herbicides--chemicals that would kill the sprouting weeds before they broke through the soil's surface. Research and practical experience in the agriculturally-advanced countries had proven conclusively that strict weed control at the earliest possible stage in the life of the crop lessened the impact of weed competition and appreciably boosted yields. Since manual or mechanical weeding so early in the game frequently damaged the tender seedlings, selective chemicals--which would kill the weeds without harming the crops--were the most effective control method.

Inspired by the OSU researchers, extension workers spread the gospel of pre-emergence herbicides among Colombian farmers with such effect that the country today accounts for more than half of the chemical weed control materials purchased by all of Latin America.

"Once the progressive farmers observe the results of field research," said one project worker, "little further educational extension is necessary to 'sell' the idea of chemical weed control."

Hundreds of new organic herbicides have appeared on the market in the last 15 to 20 years and more are coming out every week. To keep abreast of the flood, an extensive evaluation program is being conducted jointly by OSU and the University of Hawaii's College of Tropical Agriculture. In collaboration with the agricultural chemical industry of the U. S., Europe, and Japan, experimental herbicides are tested under field conditions to determine their effectiveness with important weeds of both tropical and temperate zones and to confirm their selectivity for major crops.

In 1969 the production evaluation groups at the two universities tested 146 new herbicides developed by the chemical industry. The potent weed killers must not only satisfy safe-handling standards; they must be non-persistent in the earth, so as not to contaminate the environment. Many herbicides have been developed which persist only long enough to kill off encroaching weeds and assure young crops a good start in life, whereupon they break down into their constituent chemical elements and disappear. Every effort is made by the evaluation groups to shorten the lead time between the discovery of a promising new herbicide and its release for commercial use--normally about five years.

In addition to the evaluation program, OSU has set up at Corvallis a computerized data storage and retrieval system to answer queries on weed control research from agricultural experiment stations throughout the world. The system provides specific answers to questions, such as "What is a good herbicide for the control of nutsedge?" or "What herbicides will eliminate watergrass from rice without hurting the crop?"

Building on secure foundations in Colombia, the weed control project has expanded incrementally, spreading out in ink-blot fashion to encompass contiguous regions in Ecuador, Panama, and the five Central American states. Here are some of the project's accomplishments:

- A. Practices have been developed that eliminate reductions in yield and cut costs of weed control by 50 percent or more.
- B. Full-color illustrated identification manuals of the economically important regional weeds have been published, with Spanish text, and distributed widely among farmers. Other publications include simply-written weed control recommendation sheets for major crops and educational bulletins on herbicides and spraying equipment.
- C. The most substantial and lasting results have been achieved in the project's training phase. Starting from scratch, a reservoir of trained manpower has been created, comprising 12 full-time weed research technicians with the national agriculture research institute of Colombia and two with the parallel institute of Ecuador. From its regional headquarters in El Salvador, the project is putting into effect in Central America the same basic procedures for establishing modern weed control technology that it developed in the Colombian prototype operation.

## Research Activities -

### A. Oregon

1. A program of HERBICIDE TESTING in over 30 crops is conducted annually in Oregon and Hawaii (Providing both temperate and tropical conditions) to develop information that is passed along to regional project leaders.

Based on results of this work, each year a report is prepared in which promising new herbicides are listed for the most important crops. The researcher can then select those compounds which appear most promising for his particular crop and type of weed problem. 350 copies of the 1971 "Experimental Herbicide Status Report" were sent to research workers in 35 different countries. Without a guide such as this, very few research workers in LDCs would be able to select and test the most worthwhile chemicals.

An electronic data processing system has been developed to store and retrieve this test information on herbicides.

This early testing program with new herbicides is supported primarily by grants from the world's major chemical companies. (21 companies participated in FY 1971).

2. The project conceived and inaugurated a periodic newsletter--INFOLETTER--that is sent free to researchers and other interested personnel in over 100 countries.
3. Publications --one of the major deterrents to development and adoption of modern weed control methods in LDCs. was an absence of readily available reference books on commercial herbicides, application equipment, techniques of research, etc.. Thus a goal was set to gather information and publish books as follows:
  - a. "Herbicide Use and Nomenclature Index", with tables of common and trade names for herbicides, plus a guide to herbicide usage for 68 major food and fiber crops. This was published early in 1971 and over a thousand copies have been sent throughout the world.
  - b. "Weed Research Methods Manual", a practical handbook with emphasis on establishing new weed control research programs, but of use to all weed researchers and their students. This was published in mid-1971 and is now being widely distributed. A Spanish-language edition is to be released.
  - c. Manual on Equipment Available Worldwide for proper application of herbicides and other pesticides on small farms or in research trials. This manual is in final editing stages and is ready for release.

**B. Hawaii**

In addition to the new herbicide screening program, a number of weed and brush control projects are carried out in Hawaii (under subcontract from Oregon) that provide much needed back-up research information.

Two years ago the program in Hawaii was expanded to include research on rice, taro, tropical corn and sorghum, and pasture weed control. Much of the research done in Hawaii has been directly applicable to the program in Latin America.

Listed below are research programs underway or completed in Hawaii:

1. Annual screening of new herbicides.
2. Testing of herbicide "Amiben" under tropical conditions resulting in widespread testing by the company of amiben on rice; resulting publication in 10th British Weed Control Conference.
3. Research of use of Urea fertilizer as carrier for 2,4-D for weed control in rice; resulting in publication in Proceedings of 3rd Asain-Pacific Weed Control Conference.
4. Advanced research based on early screening results with new herbicides for direct-seeded rice; resulting in publication in Proceedings of 3rd Asain-Pacific Weed Control Conference.
5. Control of woody plants in Hawaiian pastures and range land, resulting in publication in above proceedings.
6. Seed pelleting as an approach to herbicide selectivity in direct-seeded rice.
7. Research to index commercial herbicides for tropical and temperate pasture legumes and grasses.
8. Tropical sorghum and corn weed control problems, including weed control in ratoon sorghum production.
9. Weed control in taro grown under both paddy and upland conditions.

The overseas aspects of the program got underway in 1967 with the assignment of Colombia and the highlands of Ecuador to Dr. Juan Cardenas. In 1969, Mr. Lupe Garcia began a program in the five Central American countries of Guatemala, El Salvador, Honduras, Costa Rica and Nicaragua. Mr. Myron Shenk was assigned to the lowlands of Ecuador and Panama in 1970. Research progress under these programs is highlighted below.

In all cases the project operates through existing LDC institutions such as ICA (Instituto Colombiano Agropecuario), INIAP (Instituto Nacional de Investigaciones Agropecuarias) in Ecuador, and DGIEA (Direccion General de Investigacion y Extension Agropecuarias), El Salvador. Close coordination is maintained with all concerned AID Missions.

#### A. Colombia

1. Field Trials - Over 1000 experiments were carried out between 1967 and 1971, involving major programs at eight branch experiment stations in Colombia. These tests involved most of the commercial crops of Colombia, with emphasis on corn, sorghum, rice, small grains, potatoes, beans, sugarcane and citrus.
2. Special Thesis Problems - Dr. Juan Cardenas acted as advisor to advanced students in weed control, at one time working with 19 students. These students made important research contributions in areas such as weed identification, weed vs. crop competition studies and studies on physiological action of herbicides.
3. Counterparts - During this four years, full-time Colombian personnel assigned to weed control research increased from five to nineteen. There were seven experiment stations with weed control programs in 1966; by 1970 there were 15.
4. Peru - At the request of AID, Dr. Cardenas made three trips to Peru to assist them in designing weed control research programs, especially in rice. The International Rice Research Institute invited Dr. Cardenas to the Philippines in 1970 to give a report on weed control research in rice.
5. Weed Identification-Modern weed control practices cannot be effective without a knowledge of the weed species involved. In most LDCs many of the weeds, even on government experiment stations, have not been identified or

described. To fill this need, a weed identification book on cool climate weeds was prepared and published for the Colombian area in 1970. A similar, but more extensive book on tropical weeds will be published in both English and Spanish. Cost of the book is being covered by the chemical companies, local governments, the Rockefeller Foundation and RTAC.

6. Weed Control Societies - As in the United States and Europe, there is a need in the LDCs for an organization to coordinate weed control research and extension activities, plus coordinating the efforts of government, University and industry researchers. Project presence in Colombia was instrumental in supporting formation of a Colombian weed society (COMALFI). The same support has been accorded the recent organization of a Latin American Weed Society (ALAM). Earlier, project personnel had been prime movers in the establishment of the Asian-Pacific Weed Society which, in turn, has inspired an Indonesian and a Malaysian group.

#### D. Central America

Mr. Lupe Garcia, headquartered at San Salvador, has been able to make progress in weed control research in two years in this area.

1. Field weed control trials have been completed or are underway on over 20 crops plus additional research on pasture weeds and brush and aquatic weeds.
2. The number of experiment stations and full-time personnel working on weed control has increased as follows:

<u>country</u>	<u>stations</u>		<u>personnel</u>	
	<u>pre-project</u>	<u>current</u>	<u>pre-project</u>	<u>current</u>
El Salvador	-	2	$\frac{1}{4}$	1
Costa Rica	-	3	1	1
Guatemala	-	2	-	1
Honduras	-	2	-	1
Nicaragua	-	4	-	1

3. Six student thesis problems are either being directly advised by Mr. J. G. Garcia, regional project leader, or by project counterparts in the various countries.
4. Identification and description of important weeds by species has begun with a goal of publishing and identification manual by 1972.

**E. Lowlands of Ecuador and Panama**

Ecuador

During the one year since this project was established the major accomplishments have been:

1. Working with the government organization, INIAP, 36 weed control experiments have been established in crops and pasture lands at five experiment stations.
2. Four research counterparts have been assigned to work with Shenk (vs. none on weed control previously).
3. A project to identify and describe the major weed species is underway and should be completed by 1972.

Panama

1. Approximately 20 research trials have been established at five locations. The program in Panama is being carried out cooperatively with the National University and the Ministry of Agriculture.

**E. Dissemination and Utilization of Research Results**

Although the focus of the Oregon State/AID weed control project is toward research, two of the stated project objectives are, (1) assist host countries in applying appropriate new weed control methods, and (2) promote demonstration and educational activities. These activities are normally referred to as Extension, but it is essential that research information and technical assistance be present to back up Extension.

The Oregon State project has backed up this extension effort as follows:

- A. Assistance in preparation of weed control recommendation bulletins. Such bulletins have been published by AID for maize, sorghum, banana, sesame, peanuts, soybeans and beans,

wheat and barley (control of wild oats), irrigated rice, and on specific control of kikuyu grass, false cocklebur, water hyacinth, raoul grass, and ironweed. Besides a concise text (in Spanish), these sheets feature: tables on amounts of various herbicides to apply for differing soil conditions; list of weed resistance/susceptibility; and, recommendations on time of application.

- B. A weed control extension specialist from the University of California spent 90 days as consultant with the program at various sites in Latin America. His efforts were instrumental in crystallizing utilization of research, particularly with regard to organizing, selecting and preparing data for inclusion in the above-mentioned recommendation sheets.
- C. In-field project staff members have assisted in the organization, and participated in the presentation, of weed control short courses in most of the eight countries where the project has been active. Similar short courses were also conducted in Brazil, Paraguay, Bolivia and Peru early in 1971 at the request of AID/Washington. Subject matter covered background basics and stressed safety in the correct use of herbicides and application equipment. Host-country counterparts have been actively involved in all phases of these sessions.

F. Statement of Expenditures and Contractor Resources

Estimated Costs:

Funding Through FY 70		\$1,013,509
Funding Fiscal FY 71	(April 1, 1971 to March 30, 1972)	369,000
	(April 1, 1972 to June 30, 1972)	92,250

Status of Project

Progress towards the stated objectives has been excellent, considering the time the program has been operating in the field, according to a reviewer of the field activities. Research in progress has demonstrated the value of the program. The program leader in the field; has the freedom and exercises it to get the job done as he sees it. Everyone seems to understand the organizational objectives of the project and appears to be in harmony with it.

The Oregon State University weed control staff is well recognized internationally for its competence, quality and strength. Its competence has been further enhanced by the cooperative relationship developed with the University of Hawaii. The staffs of the two Universities represent one of the largest and one of the best known sources of competency on the biophysical aspects of weed control. This competency is backed by a strong graduate training program, particularly at O.S.U. where about twenty percent of the weed control graduate students in the U.S. are enrolled.

### G. Work Plan and Budget Forecast for Coming Year

The major emphasis of the project in Central America, Colombia, and Ecuador will be to continue the development of competent research staffs in weed control, help organize a coordinated research program on the major weed problems and encourage improved weed control as a part of the production program for the principal food crops. Greater emphasis will be placed on establishing the concept of improved weed control as an integral part of the production package. This will require close coordination with the various crop production research projects.

So far the major efforts of the contract have been devoted to the primary food crops, such as rice and corn. It is anticipated that greater emphasis will be placed on improving forage production through bush and other weed control on pastures and ranges.

In order to determine the feasibility of developing recommendations for improved weed control that are broadly applicable in areas of similar crop production, a series of coordinated research projects covering selected locations throughout the countries cooperating under this contract will be established. Emphasis will be placed on the most promising practices that have been developed for the primary food crops. Initial emphasis will be placed on major crops, such as corn and rice. This research will be organized and coordinated under the leadership of the technical support section of the central staff at Corvallis.

Survey work has been done in some Asian countries. If sufficient budget is supplied, the work will be increased in selected countries. In each case the cooperation of other agencies such as FAO will be solicited.

The effort made so far in organizing professional societies to act as vehicles for the exchange of information and initiating action programs to speed the adoption of modern weed control technology, will be continued.

Research support by the central staff, to develop new solutions to weed problems that have defied efficient control methods, will be continued and intensified.

The exchange of information through INFOLETTER and other publication projects by the central staff and in each country by the regional project leaders will be continued.

COLOMBIA

The major effort will be toward completing the programs now in progress and to aid the counterparts to take over the entire leadership of the comprehensive research network that has been established with the intention of starting phase-out of assistance.

ECUADOR AND PANAMA

This project is in the early phases of establishing effective research programs by counterparts training and establishment of coordinated research programs. The major efforts will be directed toward developing the staff and research programs to a full functional basis by the end of the year. Work will be concentrated on rice and corn.

CENTRAL AMERICA (El Salvador, Guatemala, Honduras and Costa Rica)

Initial counterpart selection and establishment of research efforts has been completed in each country. The activity in the coming year will be devoted to developing the new counterparts into a network of trained staff with cooperative research efforts covering the Central American Republics. In El Salvador, where the first work was initiated, staff training and research results are now adequate to aid in the development of extension functions.

HAWAII

The subcontract program with the University of Hawaii will be continued with the primary effort devoted to consultant help in pasture and range programs for the Latin American projects. Exploring new practices for weed control in rice, corn and sorghum will be expanded from a limited start this past year. Special projects on the control of nutsedge *Cyperus* sp. will be continued.

MISSION SUPPORT

Assistance will be provided AID missions to back-stop their needs in weed control to the extent the budget will permit. Short courses were presented in six locations in South America this past year in support of mission programs in addition to TDY duty to Peru by Dr. Cardenas, project leader in Colombia.

World-wide Scope:

The OSU program can be extended specifically or generally, to other AID regions. For example, on aquatic weeds in Southeast Asia, or on rice and pasture weeds in Africa.

The OSU project procedure is particularly effective in three areas: (a) developing effective local institutions, (b) encouraging leadership, and (c) promoting cooperative relationships in each country. Mainly, in-country results have been accomplished by training local government research institution staffs in modern weed control methods and then helping to develop effective research programs involving the personnel trained.

**Tentative Budgets for Alternatives of Expansion of Program:**

The following pages present budgets for 1972 to 1976:

- A. Continue current program.
- B. Continue current program plus the addition of a two-man expansion in Latin America.
- C. Continue current program and three-man expansion in Southeast Asia.
- D. Continue current program and expansion in Latin America and in Southeast Asia.

SUMMARY OF BUDGET ALTERNATIVES

	<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>	<u>1975-76</u>	<u>TOTAL</u>
<u>BUDGET A:</u> Continue Current Program	\$404,088	\$428,635	\$454,829	\$482,780	\$512,614	\$2,282,946
<u>BUDGETS A + B</u> Continue Current Program + Addition of 2-man Expansion in Latin America	469,069	493,024	518,901	550,777	584,794	2,616,565
<u>BUDGETS A + C</u> Continue Current Program + Addition of 3-man Expansion in Southeast Asia	448,408	503,582	562,254	580,485	616,399	2,711,128
<u>BUDGETS A + B + C:</u> Continue Current Program + Expansion in Latin America + Expansion in Southeast Asia	513,389	567,971	626,326	648,482	688,579	3,044,747

BUDGET A - CONTINUE CURRENT PROGRAM

	<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>	<u>1975-76</u>	<u>TOTAL</u>
<u>SALARIES AND WAGES:</u>						
Administration	\$ 61,620	\$ 65,934	\$ 70,549	\$ 75,487	\$ 80,772	\$ 354,352
Oregon Back-up Research	39,014	41,745	44,667	47,793	51,138	224,357
Information Services	44,976	48,124	51,493	55,097	58,954	258,644
Latin American Staff	52,687	56,375	60,302	64,544	69,062	302,990
<u>Subtotal</u>	<u>\$198,297</u>	<u>\$212,178</u>	<u>\$227,031</u>	<u>\$242,921</u>	<u>\$259,926</u>	<u>\$1,140,353</u>
<u>PAYROLL ASSESSMENTS (12%)</u>	\$ 23,795	\$ 25,462	\$ 27,244	\$ 29,150	\$ 31,191	\$ 136,842
<u>INDIRECT COSTS:</u>						
On-Campus (45%)	65,524	70,111	75,019	80,270	85,889	376,813
Off-Campus (25%)	13,172	14,094	15,080	16,136	17,265	75,747
<u>TRAVEL AND ALLOWANCES</u>	41,800	43,890	46,084	48,388	50,807	230,969
<u>EQUIPMENT</u>	5,000	5,250	5,513	5,789	6,078	27,630
<u>HAWAII SUBCONTRACT</u>	15,000	15,000	15,000	15,000	15,000	75,000
<u>OTHER DIRECT COSTS</u>	<u>41,500</u>	<u>42,650</u>	<u>43,858</u>	<u>45,126</u>	<u>46,458</u>	<u>219,592</u>
<u>TOTALS</u>	<u>\$404,088</u>	<u>\$428,635</u>	<u>\$454,829</u>	<u>\$482,780</u>	<u>\$512,614</u>	<u>\$2,282,946</u>

BUDGET - POTENTIAL LATIN AMERICAN EXPANSION PROGRAM

	<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>	<u>1975-76</u>	<u>TOTAL</u>
<u>SALARIES AND WAGES:</u>						
Agronomist A	\$14,300	\$15,301	\$16,372	\$17,518	\$18,744	\$ 82,235
Agronomist B ( $\frac{1}{2}$ first year)	<u>7,150</u>	<u>15,301</u>	<u>16,372</u>	<u>17,518</u>	<u>18,744</u>	<u>75,085</u>
<u>Subtotal</u>	\$21,450	\$30,602	\$32,744	\$35,036	\$37,488	\$ 157,320
<u>PAYROLL ASSESSMENTS (12%)</u>	2,574	3,672	3,929	4,204	4,499	18,878
<u>INDIRECT COSTS:</u>						
On-Campus (45%)	4,826	-	-	-	-	4,826
Off-Campus (25%)	2,681	7,650	8,186	8,759	9,372	36,648
<u>TRAVEL AND ALLOWANCES</u>	10,200	13,390	13,984	14,607	15,261	67,442
<u>EQUIPMENT</u>	5,000	6,000	2,000	2,000	2,000	17,000
<u>OTHER DIRECT COSTS</u>	<u>18,250</u>	<u>3,075</u>	<u>3,229</u>	<u>3,391</u>	<u>3,560</u>	<u>31,505</u>
<u>TOTALS</u>	\$64,987	\$64,389	\$64,072	\$67,997	\$72,180	\$ 333,619

BUDGET C - POTENTIAL SOUTHEAST ASIA EXPANSION PROGRAM

	<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>	<u>1975-76</u>	<u>TOTAL</u>
<u>SALARIES AND WAGES:</u>						
Agronomist A	\$ 14,300	\$ 15,301	\$ 16,372	\$ 17,518	\$ 18,744	\$ 82,235
Agronomist B	-	14,300	15,301	16,372	17,518	63,491
Agronomist C	-	-	14,300	15,301	16,372	45,973
<u>Subtotal</u>	\$ 14,300	\$ 29,601	\$ 45,973	\$ 49,191	\$ 52,634	\$ 191,699
<u>PAYROLL ASSESSMENTS (12%)</u>	1,716	3,552	5,516	5,903	6,316	23,003
<u>INDIRECT COSTS</u>						
On-Campus (4.5%)	3,217	3,217	3,217	-	-	9,651
Off-Campus (2.5%)	1,787	5,612	9,706	12,298	13,159	42,562
<u>TRAVEL AND ALLOWANCES</u>	6,800	13,890	21,284	22,197	23,155	87,326
<u>EQUIPMENT</u>	5,000	6,000	7,000	3,150	3,307	24,457
<u>OTHER DIRECT COSTS</u>	11,500	13,075	14,729	4,966	5,214	49,484
<u>TOTALS</u>	\$ 44,320	\$ 74,947	\$ 107,425	\$ 97,705	\$ 103,785	\$ 428,182