

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

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Bateli # 34

1. SUBJECT CLASSIFICATION	A. PRIMARY Serials	Y-AH60-0000-0000
	B. SECONDARY Agriculture--Weeds	

2. TITLE AND SUBTITLE
Weed control systems for representative farms in developing countries; annual research report, 1975/1976

3. AUTHOR(S)
(101) Or. State Univ. Int. Plant Protection Center

4. DOCUMENT DATE 1976	5. NUMBER OF PAGES 25p.	6. ARC NUMBER ARC 632.58.066as
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7. REFERENCE ORGANIZATION NAME AND ADDRESS
Or. State

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(Research summary)

9. ABSTRACT

10. CONTROL NUMBER PN-AAC-024	11. PRICE OF DOCUMENT
12. DESCRIPTORS Research	13. PROJECT NUMBER
	14. CONTRACT NUMBER AID/CM/ta-C-73-23 Res.
	15. TYPE OF DOCUMENT

Agency for
International
Development
Oregon
State
University



**WEED
CONTROL
SYSTEMS**
for
**REPRESENTATIVE
FARMS**
in
**DEVELOPING
COUNTRIES**

ANNUAL
RESEARCH
REPORT
1976

SUMMARIES

A PROJECT SUMMARY

1. Project title: WEED CONTROL SYSTEMS FOR REPRESENTATIVE FARMS IN DEVELOPING COUNTRIES.
2. Contract number: AID/CM/ta-C-73-23
3. Principal investigator: Dr. Stanley F. Miller, International Plant Protection Center, Oregon State University, Corvallis, OR / USA
4. Contract period: April 1, 1973 - December 1975, plus extensions
5. Period covered by this report: April 1, 1975 through March 31, 1976
6. Total AID funding of contract to date: \$1,093,687
7. Total expenditures and obligations through previous contract year: \$331,372
8. Total expenditures and obligations for current year: \$399,558

B NARRATIVE SUMMARY OF ACCOMPLISHMENTS AND UTILIZATION

The second year results indicate major progress in realizing project objectives of developing adequate weed control technologies and evaluating their socio-economic impacts.

In Northeast Brazil well-timed manual control continues to be the most economical technique. However, in specific weed conditions certain herbicide treatments resulted in higher levels of control. Seedbed preparation and its subsequent effect on weed growth provided increased yields over traditional seedbed preparation.

Major emphasis was placed on development of a theoretical framework and an operational computer model for evaluating societal benefits and costs from weed control technology change. Applications of the model to the Northeastern Brazil case study regions is presently in progress.

Results show that chemical weed control is important in the control of weeds in rice and potatoes in El Salvador. Manual methods, though, combine to provide good results in corn, beans and consoriated corn and beans. Advances were made in the control of Cyperus rotundus by the use of glyphosate.

Secondary and survey data were collected by an Oregon State University economist on weed control techniques. These data are presently being analyzed and will form the basis for evaluating the socio-economic impacts of the suggested weed control modifications.

Project personnel at Oregon State University, as well as off-campus, continued in developing and strengthening the weed scientific community through information dissemination, special studies and reports, and participation in workshops and conferences. Approximately 2800 copies of 13 publications were distributed. INFOLETTER was sent to 3873 scientists in 120 countries. Seventeen papers and reports were prepared and presented to scientific groups and project personnel participated in eight workshops and seminars.

WEED CONTROL SYSTEMS FOR REPRESENTATIVE FARMS IN DEVELOPING COUNTRIES
AID/CM/TA-C-73-23

ANNUAL RESEARCH REPORT 1975-1976

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GENERAL BACKGROUND

In many parts of the world the economic position of small- and medium-sized farm enterprises in developing countries has deteriorated with the advancement of agricultural technology. Costs for the requisite inputs (fertilizer, seed, irrigation) have pushed dramatic production increases out of reach, except for more affluent farmers. Economics and market realities have tended to focus the attention of agricultural input manufacturers on the larger more commercialized operations. For many countries the undeniable need to increase production has caused national agricultural development programs to neglect the small grower.

Where new technology has been utilized the weed problem has often been intensified because weeds, as well as crops, responded favorably to improved growing conditions. New cultivars have often been found to be less competitive with weeds than native varieties. Additional studies have shown that in some areas where herbicides have been used for several years weed populations have been observed to shift from relatively controllable broadleaf varieties to more pernicious grassy species that, once established, become extremely difficult to control.

The international community of organizations sponsoring agricultural development research became increasingly concerned over the deteriorating situation. Questions were raised regarding weed control needs and technologies in developing countries such as:

1. To what extent are weeds limiting production, either by their direct competition with crop plants for available nutrients, light, and water, or by their demands for agricultural inputs for control, i.e., land, labor, and capital?
2. given the prevailing constraints--economic, social, and political--what realistic level of agricultural technology could or should be instituted for weed control?
3. what is the inter-relationship of weed control technology with other advanced agricultural inputs?
4. and, how do various weed control systems--including the absence of control--affect the farmer, his family, the associated labor pool, and the community, both economically and socially?

As a result of this dialog, the AID-Oregon State University weed control research project, a contractual relationship begun in 1966, was asked to consider the newly emerging implications of weed control. The formerly production-oriented research effort was restructured in 1972 to include a broader overview of peasant farm problems and to work toward evolving weed control systems for representative farms in developing countries. At the same time, the project assumed the added dimension of assessing the social and economic impact of weed control technology related to employment and income distribution.

**A. PROJECT OBJECTIVES
AS STATED IN THE
CONTRACT**

Broadly the project constitutes one of many elements in the overall effort to raise food crop production levels. In more specific focus the target is reduction of food crop losses due to weed competition to the extent that production gains are justified economically and socially. Attempts

to develop and evaluate weed control technologies for representative farms imply a special emphasis on smaller-sized subsistence farms. Resulting technologies, or systems, are evaluated in terms of various societal goals and performance criteria, including economic efficiency, employment and income distribution.

Other stated objectives include:

- train host country counterparts in appropriate weed control research methodology;
- promote practical and safe usage of herbicides and other pesticides through training programs;
- encourage evaluation of ecological-environmental aspects of weed control systems;
- and foster continued development and maintenance of a worldwide communication/information network for weed control linking the institutions and individuals concerned.

**B. ACCOMPLISHMENTS
TO DATE**

Both agronomic and socio-economic research was performed at the Brazilian and El Salvadorian project sites, as well as training and technical assistance in weed research.

BRAZIL

Development of Economic Model for Evaluating Weed
Control Technology Change

Major emphasis was placed on development of a theoretical framework and operational computer model for evaluating societal benefits and costs from weed control technology change. This framework stresses: identifying the underlying cause motivating adoption of new technology, either government policy price distortions or efficiency enhancing technical developments; and distinguishing efficiency losses from distributional losses.

Application of the model to two Northeastern Brazil case study regions is now in progress. A description of the results will be included in the project terminal report.

Project personnel also conducted an extensive review of relevant economic and agronomic literature and of available Brazilian agricultural data sources before and during the process of methodology development.

Caruaru Municipio Farm Survey Results

The data from a 71-farm stratified random sample survey conducted during late 1974 in Caruaru municipio, Pernambuco, was analyzed in detail during 1975. In late 1975 the project conducted a follow-up survey (focusing on long-run crop yield variability) that included 29 of the 1974 interviewees, plus 14 additional selected farmers.

Some findings of the farm survey were:

1. Small farmers and tenants were the primary producers of the basic food crops--corn, beans, and cassava--that the project is concerned with. Large farmers emphasized livestock enterprises, forage crops, and some perennial cotton.
2. Hired labor used on medium or large farms was primarily drawn from the vast number of very small farmer and tenant households. Many of these small farmers/hired workers also found employment in the non-farm sector, or in home industries. Many larger farmers also had other sources of income from business, service, or professional activities. Two-thirds of all owners of farms larger than 50 hectares did not reside on their farms, but nearly all small farmers were resident operators.
3. Families of the very small farmer/worker, whose properties ranged in size from a residential plot to two hectares, suffered substantially poorer diets, school attendance rates, and income levels than farmers with slightly larger properties. Many had traveled to areas outside the county to seek employment in the past.
4. Ant poison was the only modern input employed by a majority of sampled farmers; chemical fertilizer was used on only one sample farm. About one quarter of farms over two hectares had used some animal or tractor power, usually rented, for land preparation.
5. Crop yields per hectare were consistently low and did not vary significantly by farm size.

6. Weed control was carried out exclusively by manual hoeing on 100% of the sample farms. Rare instances within the municipio of the use of animal traction cultivation in cassava, and herbicides in vegetables were noted outside of the survey. Not one of these exceptions occurred in the survey random sample indicating the dominance of traditional weed control technology in the area. Rationality of this choice is supported by the results of repeated project experiments on the efficacy of hoeing for local crops, as well as the economics of use in the popular combination of intercropped corn and beans.
7. Farmers in the sample hoed local crops well within the early critical period of weed competition and, if anything, hoed more frequently than was minimally necessary to prevent crop yield reductions. These findings contradict frequent observations in other regions, especially Africa, that small farmers either hoe too late or not enough. Undoubtedly the availability of labor and the severity of the weed problem are key factors in this issue.

Agricultural Policies Study

The project, in collaboration with a University of Wisconsin/USAID economist, conducted a detailed study of the impact of government agricultural policies in Northeast Brazil according to farm size. The study, based on government secondary data and project findings in Caruaru municipio, revealed that small farms were several times more productive in the use of land than large farms, but that they benefited much less from government agricultural credit or extension services and carried a disproportionately heavier property tax burden.

Economic Evaluation of Alternative Weed Control Systems

A second year's experimental results and additional budgeting analyses generally confirmed the preliminary economic conclusions concerning efficient weed control systems for corn and beans. Sorghum, included for the first time in 1975 experiments, generally conformed to the same pattern as monoculture corn; if one weeding was sufficient for effective weed control, then animal traction cultivation plus intra-row hoeing was most efficient, whereas pre-emergence herbicides had a slight cost advantage in situations requiring two weedings. From a practical standpoint, however, conclusions concerning monoculture crops are of limited value in the Pernambuco Agreste because all food crops, except cassava, are commonly intercropped. In the common intercropping combinations, neither herbicides nor animal traction cultivation are technically or economically viable. Manual hoeing is an effective and relatively low-cost weed control technique in labor-abundant, low-wage Northeast Brazil.

Agronomic Research Continued

Agronomic research in 1975 was designed to confirm and expand the principal findings from the previous year. Experiments again were established for beans, cassava, and beans-corn intercropped, plus an additional trial series with sorghum. The objectives were: (1) to compare weed control systems based on manual, mechanical, chemical, and integrated methods; (2) to observe herbicide selectivity and efficacy in the various crops; and (3) to note variations in weed control based on pre-planting soil management practices using manual, mechanical, and chemical methods.

All field experiments, except the three herbicide selectivity trials, were conducted using traditional methods for the region (manual seedbed preparation without the addition of fertilizer). Several experiments were established in a field that had not been cropped the previous five years.

Weed Control Results

Results from the 1975 round of trials (with the exception of cassava which was not harvested until May-June 1976) support the conclusions from 1974: well-timed manual weed control (hoeing) was a generally effective technique under the prevailing soil, water, and crop conditions. Some herbicide treatments resulted in higher levels of control, particularly for monoculture corn, or where grassy weeds predominated, but several herbicides tested caused crop injury.

Seedbed preparation with a pedestrian-controlled power tiller provided improved weed control over traditional preplant land clearing (hoeing and some burning). This may have been due in part to creating an improved soil condition for the development of the crop plants.

EL SALVADOR

Farm Survey Undertaken

An agricultural economist spent eight weeks in El Salvador planning and carrying out a selected sample of small farmers and in collecting other supporting, secondary socio-economic data.

Twelve farmers with holdings ranging in size from under one hectare to over 40 were interviewed. The results are anticipated to provide a profile of weed control technology employed by farm size and other factors and to provide a different ecological and technical setting for evaluating societal benefits and cost from weed control.

Agronomic Research Continued

Rice, maize, beans, and potato trials were conducted during the year to further assess and refine the initial round of experimentation carried out in 1974-75.

Without some form of weed control, rice yield was nil. Hand weeding provided some return on investment, depending on the number of weedings. Combined manual weeding and herbicide application (propanil + 2,4,5-T) resulted in increased returns.

Results from the maize work were unclear, but in potatoes, application of herbicide (EPTC + metribuzin) provided a superior yield to plots receiving solely manual weedings.

Beans demonstrated a positive response to fertilizer with or without a weed control program. However, in three out of four trials, there was a positive response to weed control. One trial, carried out during the dry season and producing results with a higher degree of reliability, suggested a positive response to chemical weed control (EPTC + linuron) and no response to hand weeding.

Experimentation was also continued in methods of controlling purple nutsedge (*Cyperus rotundus*) a severe and common problem weed in much of the tropical world. Application of the new herbicide Glyphosate showed the greatest promise.

C. DISSEMINATION AND UTILIZATION OF RESEARCH RESULTS

AID, OSU and CIAT Join to Offer Short Course

An intensive 4-week weed control short course sponsored by AID and held at CIAT (Centro Internacional de Agricultura Tropical), Cali, Colombia, in collaboration with IPPC (International Plant Protection Center) at Oregon State University, was presented to 31 weed researchers from 12 Latin American nations.

A joint CIAT/IPPC team of instructors presented information, all in Spanish, covering subject matter ranging from basic definitions to sophisticated research technology. A variety of activities included classroom lectures and group discussion (71%), field trips (13%), plus laboratory exercises and actual plot work (16%).

Participants attending the June 15-July 12 course represented governmental experiment stations (15), educational institutions (7), and private industry and other (9). Twenty were provided full financial support by AID and 11 were self-supporting. All held an Ing. Agr. degree or higher and had experience in agricultural research.

Two 2-hour written examinations were given participants; the first day of the course, and again at the end of the course. The second exam contained material 75 percent identical to the first. There was a 25 percent overall improvement in the group's test scores. One individual increased his score from 2 points to 70. A before-and-after laboratory practical exam was also given resulting in a 37 percent average overall improvement.

A course evaluation form filled out by each participant indicated that 82 percent of activities were rated 80 or higher on a 0-poor, 100-excellent scale. Eighty-six percent of the participants stated that a similar course should be offered at least every other year, if not yearly. Participating CIAT and IPPC staff also expressed strong interest in conducting similar courses in the future.

A 32-page terminal report for the short course presents extensive detail concerning origin of participants, financing, participant evaluation, evaluation by course organizers, and recommendations. Copies of the report (No. 15-C-75) are available from IPPC.

Conference Participation

Project staff participated in, or attended, a number of professional meetings and conferences during the reporting period including those of the joint Latin American Weed Association (ALAM) - Argentine Weed Association (ASAM), Asian Pacific Weed Science Society, Brazilian Herbicide and Weed Science Society, the Colombian Society of Weed Control and Plant Physiology (COMALFI), and the Weed Science Society of America (WSSA). Appendix I contains bibliographic references for papers presented at various meetings.

Brazil Project Staff Activities

Weed control experiments were planned with leaders of the sorghum, corn, soils and bean programs of the State of Pernambuco Agronomic Research Institute, Recife, (IPA). In all cases considerable emphasis was placed on improved manual-mechanical technologies rather than just on chemicals.

Detailed rice weed control experiments were also planned with leaders of the National Program of Works against Droughts (DNOCS).

Extensive assistance in weed control on the Federal Experiment Station in Cruzeta, Rio Grande do Norte, was also provided, as well as with the new National Semi-Arid Agricultural Research Center, Petrolina, Pernambuco. These latter two Experiment Stations are a part of the National Corporation of Agricultural Research (EMBRAPA) which is under the Ministry of Agriculture.

In addition to cooperative research efforts, project staff assisted in training programs. An agronomist from the Southern Agricultural Research Institute, Pelotas, Rio Grande do Sul, was sent to Recife for a one month field training experience in weed control technology. The Experimental Sugarcane Station in Maceio, Alagoas, also sent two men who trained with project personnel for two weeks. These two men will be responsible for all institutional sugarcane weed control research in Northeast Brazil.

Seminars and Short Courses

While the project's main effort in training was connected with the CIAT/OSU/AID short course, staff did take part in a number of other courses and seminars as follows:

EMBRAPA Seminar. Agro-Economic Results of Project Research in 1974. Shenk and Young. Brasilia, D. F., June 20, 1975.

Fundacao IPEA Seminar. Differential Impact of Selected Agricultural Policies According to Farm Size: A case study in the "Agreste" Region of Northeast Brazil. Young and Corum, Brasilia, June 20, 1975.

EMBRAPA Special Training Seminar. Agro-Economic Considerations of Research Programs. Shenk. Brasilia, July 24, 1975.

IPA-EMBRAPA Weed Control Short Course. Fisher and Shenk. Recife, October 21-22, 1975.

Bolivia Weed Control Short Course. Fisher. Santa Cruz, Bolivia, March 22-26, 1976.

Joint Oregon State University Agronomic Crop Science/Soil Science Department International Agricultural Seminar. An Agro-Economic Evaluation. Shenk and Young. Corvallis, Oregon, March 3, 1976.

Workshop on Research Methodology in Weed Science. Burrill. Bandung, Indonesia. June 18-21, 1975.

Infoletter Continued

Five issues of INFOLETTER, the free periodical issued through IPPC with project support, were published during the report period. Editorial thrust remained oriented toward emphasizing a variety of weed science facets deemed useful to a developing countries readership. INFOLETTER is currently sent to 3,873 recipients in over 120 countries (Appendix II).

A sampling of the news items that appeared during the report period includes:

Ag product symbols created

Do weeds worry small farmers?

AID, CIAT, IPPC link to offer weed short course

Weed scientists agree to form global society

AID provides research abstracts

Weed control: plant vs. plant

Weed Control: pathogens vs. plant

USA enacts weed law

ICRISAT picks weed researcher

Philippines stresses need to weed rice

AID pest management effort starts 5th year

"Empty" drums not so empty

Each issue also carries lists of relevant publications (and the sources from which they may be requested) as well as announcements of forthcoming conferences, seminars, and short courses. An additional feature in nearly every issue spotlights equipment that might be of interest, such as a handheld, inexpensive low-volume sprayer designed for LDCs; a manually-pushed, ground actuated inter-row sprayer; a manually operated mixer, and a low-cost granule spreader. No brand names appear in the article, but a statement printed with each feature offers to provide manufacturer names and addresses in response to requests. The feature seems to be well-received; there were over 20 inquiries (at the time of this writing) for information concerning equipment mentioned in the February 1976 issue of INFOLETTER.

The American Association of Agricultural College Editors selected INFOLETTER for a blue ribbon (superior) award in national competition during 1975. Out of 30 entries in the direct mail newsletter category, seven were rated superior, six excellent, and ten good. INFOLETTER won an "excellent" award in 1973.

Inquiries Handled by Project Staff

Inquiries concerning weed control, ranging from fairly brief, specific questions to broad entreaties for assistance of any kind, continued to be received and answered by project staff both in the field and at Corvallis. No incoming inquiry was ignored; some sort of response, dependent upon the nature of the inquiry, was provided in every case. Often the request could be satisfied by providing published materials, or the names of local weed research authorities, or other contacts. Brazil and El Salvador based staff fulfilled an unofficial consulting role frequently providing specific weed control information. In special instances, requests were forwarded to a third party, in which case the requestor was so notified.

Other Information Activities

The international list of recent texts and current periodicals related to weed research and control, SELECTED PUBLICATIONS AND PERIODICALS TO ASSIST IN SUPPLEMENTING, EXPANDING, OR ESTABLISHING A WEED SCIENCE LIBRARY, was revised during the year. IPPC mailed out 272 copies of the free list during the report year.

More than 2,800 copies of 13 publications were distributed during calendar 1975. A country-by-country and title-by-title analysis appears in Appendix II (World Distribution of Publications).

Interest in IPPC Papers continued to be active as a total of 824 copies were distributed in response to requests. Two new titles were added in 1975.

D. WORK PLAN FOR THE COMING YEAR

The project (extension) concludes September 30, 1976; however, the work plan terminates as of June 30, 1976. A new program has been launched with many of the same objectives, but expanded to include a more concentrated effort in technical assistance to disseminate, and expand research activities.

Remaining items under the current work plan call for completion of all existing research, the recall of personnel from El Salvador and Brazil, and preparation of a project terminal report to cover the full scope of activities and findings.

**E. INVOLVEMENT OF
MINORITY PERSONNEL
AND WOMEN**

During the present reporting year the project employed 14 individuals on a half-time or better basis. Six were female and two of the females were Latin American/Spanish. One Spanish weed specialist was employed.

Past and planned activities include efforts to widely publicize opportunities with the program. All qualified candidates for all positions will be considered for any unfilled positions.

**F. SMITHSONIAN SCIENCE
INFORMATION EXCHANGE, INC.**

Appropriate forms Notice of Research Project have been requested from the Smithsonian Science Information Exchange, Inc., but had not been

received and completed at the time of this writing.

**G. STATEMENT OF EXPENDITURE
AND OBLIGATIONS AND
CONTRACTOR RESOURCES**

The following table lists the expenditures and obligations related to the four broad work areas of the project during the period April 1, 1975, through March 31, 1976.

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

Classification	Corvallis: Head- quarters	Corvallis: Publi- cations	Brazil	Central America	LINE TOTALS
Salaries and Wages	\$100,683.81	\$12,325.94	\$34,489.15	\$21,951.96	\$169,450.86
Payroll Assessments	14,668.60	1,798.10	5,481.10	3,193.61	25,141.41
Indirect Costs:					
on campus	46,038.53	5,573.79	--	--	51,612.32
off campus			11,297.57	7,216.62	18,514.19
Total					(70,126.51)
Consultants	4,905.03		--	--	4,905.03
Travel, Trans- port. and Allowances	30,189.53		49,563.80	12,974.22	92,727.55
Other direct Costs	4,555.08	404.94	2,035.98	506.79	7,502.79
Equip., Vehicles, Mat. and Supplies	14,140.30	12,788.48	1,044.09	1,730.84	29,703.71
TOTALS	215,180.88	32,891.25	103,811.69	47,574.04	399,557.86

NOTE: CONFIDENTIAL

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H. STATEMENT OF ANTICIPATED
EXPENDITURE FOR PERIOD
UNTIL PROJECT TERMINATION

The following table indicates the anticipated expenditures from April 1, 1976, to September 30, 1976 out of the existing funds. No new authorization is required.

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

Classification	Corvallis: Head- quarters	Brazil	Central America	LINE TOTALS
Salaries and Wages				
On Campus	\$10,143.00	--	--	\$10,143.00
Off Campus	--	\$4,629.00	\$8,022.00	12,651.00
				22,794.00
Payroll Assessments	1,623.00	808.00	1,284.00	3,715.00
Indirect Costs				
On Campus	4,587.00	--	--	4,587.00
Off Campus	--	1,533.00	2,656.00	4,189.00
				8,776.00
Travel and Transportation	1,000.00	6,555.00	6,629.00	14,184.00
Allowances	--	3,330.00	2,500.00	5,830.00
Other Direct Costs	400.00	--	--	400.00
Materials, Supplies, Equip., Freight	5,180.00	500.00	1,000.00	6,680.00
TOTALS	22,933.00	17,355.00	22,091.00	62,379.00

NOTE: CONFIDENTIAL

Please remove this page of the 1975-76 Annual Report before circulating the latter outside AID/W.

APPENDIXESAPPENDIX I - BIBLIOGRAPHIC LIST

Burrill, Larry. 1975. APPLICATION TECHNIQUES FOR CHEMICAL WEED CONTROL. Paper presented at the Workshop on Research Methodology in Weed Science, Bandung/Indonesia, June 18-21, 1975.

Discussion of equipment and techniques for weed control research with emphasis on developing countries; to be included in weed research publication by Weed Science Society of Indonesia and BIOTROP

.....

Burrill, Larry. 1975. HERBICIDES ON PEASANT FARMS. Paper presented at the 5th Asian Pacific Weed Science Society Meeting, Tokyo/Japan, October, 1975.

Discussion of problems associated with use of herbicides on peasant farms and some suggestions on where herbicides can be used.

.....

Chase, Richard. 1976. EFECTO DE LOS INTERVALOS ENTRE APLICACION Y LABRANZA EN EL CONTROL DE CYPERUS ROTUNDUS CON GLIFOSATO. Paper presented at ALAM/ASAM meeting, Mar del Plata/Argentina, March 29-April 3, 1976.

Discusses the effects of varying intervals of time in the application of Glyphosate for the control of Cyperus rotundus.

.....

Deutsch, A. E. 1975. FRESH INTEREST IN SMALL EQUIPMENT FOR PESTICIDE APPLICATION. SPAN 18, 3, 1975.

Increasingly widespread usage of pesticides has prompted a resurgence of interest in smaller, lower-cost pesticide application equipment that better suits the needs of small farmers.

.....

Deutsch, A. E. and Larry Burrill, 1975. A PROGRAM IN BROAD BASED WEED SCIENCE EDUCATION. Paper presented at the 5th Asian Pacific Weed Science Society Meeting, Tokyo/Japan, October, 1975.

The need for trained weed scientists also indicates a need for stepped up formal and informal training efforts incorporating exposure to a wide range of related information.

International Plant Protection Center. 1975. WEED CONTROL SHORT COURSE. Centro Internacional de Agricultura Tropical, Cali/ Colombia, and the International Plant Protection Center, Oregon State University. Report 15-C-75. 32 pages.

The terminal report for a month-long short course held at CIAT during June and July, 1975.

.....

International Plant Protection Center. 1975. PRELIMINARY STATISTICAL SUMMARY OF THE 1974 CARUARU FARM SURVEY: GENERAL FARM AND FARM OPERATOR CHARACTERISTICS. Oregon State University.

International Plant Protection Center. 1976. OSU/EMBRAPA/USAID PROJECT SURVEY RESULTS: MISCELLANEOUS TABLES ON AGRICULTURAL LAND USE, CROP YIELDS, AND CROP PRODUCTION LABOR REQUIREMENTS IN CARUARU MUNICIPIO, PERNAMBUCO, BRAZIL, 1974-1975. Oregon State University.

These two reports summarize the results of the 1974 and 1975 farm surveys conducted by the Project.

.....

International Plant Protection Center. 1976. BIBLIOGRAPHY FOR BRAZIL WEED PROJECT AGRO-ECONOMIC RESEARCH: PRELIMINARY VERSION. Oregon State University.

A listing of articles, publications and other materials concerning the economics of technological change in agriculture, agronomic and economic aspects of weed control, plus related literature collected and received by project personnel.

.....

International Plant Protection Center. 1976. PROGRESS REPORT AND SUMMARY OF METHODOLOGICAL FRAMEWORK OF THE USAID/OSU WEED CONTROL PROJECT IN BRAZIL: WEED CONTROL SYSTEMS FOR REPRESENTATIVE FARMS IN DEVELOPING COUNTRIES, AID/CM/ta-C-73-23. Oregon State University.

A summary of the methodological framework used by the Project for evaluating the economic efficiency and welfare implications of changes in weed control technology in selected settings in Northeast Brazil. The framework considers losses borne by displaced labor when herbicides are adopted as well as efficiency effects. Special attention is devoted to identifying the role of government policies in promoting the adoption of labor-saving weed control techniques.

Locatelli, Eduardo, A. P. Appleby, T. C. Allen, P. A. Koepsell and H. J. Jensen. 1976. DIAGNOSIS OF TOBACCO RATTLE VIRUS AND POTATO VIRUS X IN WEEDS AND ROTATION CROPS IN OREGON / MALEZAS COMO PORTADORAS DE VIRUS: DETECCION DE VIRUS EN MALEZAS Y PLANTAS CULTIVADAS EN AREAS DE PRODUCCION DE PAPAS EN EL ESTADO DE OREGON CON ESPECIAL ENFASIS EN TRV (VIRUS DEL CASCABEL DE TABACO - TOBACCO RATTLE VIRUS) Y X DE LA PAPA). Paper presented at the joint ALAM/ASAM meeting, Mar del Plata / Argentina, March 29 - April 3, 1976.

The results of a survey to determine the wild host of viruses with emphasis on TRV and PVX are reported here. Amaranthus retroflexus L. and Solanum sarrachoides were found to carry both tobacco rattle virus and potato virus X.

.....

Locatelli, Eduardo. 1976. RESIDUOS DE HERBICIDAS EN EL SUELO. Paper presented at COMALFI meeting, Barranquilla / Colombia, January 28 - 30, 1976.

Several aspects of residues of pesticides in general were covered. Risks (such as damage to next crop), resistance, and environmental contamination and benefits and need for season-long control were discussed. Factors affecting persistence and means of avoiding it were outlined.

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Miller, S. F. 1975. ECONOMICS OF HERBICIDE USE. Paper presented at the 5th Asian Pacific Weed Science Society meeting, Tokyo / Japan, October, 1975.

Economic as well as social evaluation of herbicide use is discussed. The failure of the market to give acceptable levels of social welfare may require overt intervention in the market system. Specific consideration is given to unemployment and income distribution.

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Scolari, D. and D. Young. 1976. AVALIACAO AGRONOMICA E ECONOMICA DE SISTEMAS ALTERNATIVOS DE CONTROLE DE ERVAS DANINHAS EM MILHO E FEIJAO NO AGRESTE PERNAMBUCANO. Manuscript submitted to Pesquisa Agropecuaria Brasileira.

Scolari, D., D. Young, and E. Locatelli. 1976. EVALUACION AGRO-ECONOMICA DE SISTEMAS ALTERNATIVOS DE CONTROL DE MALEZAS EM MAIZ Y FRIJOL EM EL AGRESTE PERNAMBUCANO. Paper presented at COMALFI meeting, Barranquilla/Colombia, January 28-30, 1976.

These two papers present the results and economic evaluations of experiments in corn and beans which compared manual, mechanical, chemical and integrated methods of weed control.

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Shenk, M., D. Young, H. Fisher and E. Locatelli. 1976. VIABILIDAD AGRO-ECONOMICA RELATIVA DE METODOS ALTERNATIVOS DE CONTROL DE MALEZAS PARA PEQUENOS PRODUCTORES EM EL NORDESTE DE BRASIL. Paper presented at the joint ALAM/ASAM meeting, Mar del Plata, Argentina, March 28 - April 3, 1976.

The relative advantages of alternative weed control systems for small farmers producing corn, beans, and sorghum in Northeast Brazil are compared. Traditional hoeing or intermediate techniques such as cultivation with animal-pulled implements, were found to be equally effective, and to be more acceptable from an economic and social perspective in this labor-abundant area.

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Young, D. and K. Corum. 1975. O IMPACTO DIFERENCIAL DE ALGUMAS POLITICAS DE ACORDO COM O TAMANHO DE PROPRIEDADE: O ESTUDO DE UM MUNICIPIO NA REGIAO DE AGRESTE NA NORDESTE DO BRASIL. Paper presented at Fundacao IPEA Seminar, Brasilia, DF/Brazil, June 20, 1975; published version in IPEA Boletim Economico (May-June 1976); 21-33.

Based on farm survey results and secondary data, it was found that small farmers (in the case study region) were several times more productive in the use of their land than large farmers. Small farmers, however, received substantially less agricultural credit and extension assistance from government agencies. Small farms also paid property taxes that were several times higher than those paid by large farms in the region.

KEY

1. Infoletter: A periodic newsletter issued free by the International Plant Protection Center.
2. Aquatic Equipment: SOME EQUIPMENT FOR MECHANICAL CONTROL OF AQUATIC WEEDS.
3. Aquatic Weeds: MALEZAS ACUATICAS/AQUATIC WEEDS
4. Bibliography: BIBLIOGRAFIA PARCIAL DE INVESTIGACION SOBRE MALEZAS Y SU CONTROLE PARA AMERICA DEL SUR, AMERICA CENTRAL, EL CARIBE Y MEXICO 1942-1972.

A PARTIAL BIBLIOGRAPHY OF WEED RESEARCH AND CONTROL PUBLICATIONS FOR SOUTH AND CENTRAL AMERICA, THE CARIBBEAN, AND MEXICO, 1942-1972.

BIBLIOGRAFIA PARCIAL SOBRE A PESQUISA E O CONTROLE DE ERVAS DANINHAS PARA AMERICA DO SUL, AMERICA CENTRAL, CARAIBAS E MEXICO 1942-1972.

5. Equipment Manual: MANUAL OF PESTICIDE APPLICATION EQUIPMENT.
6. Experimental Herbicides: EXPERIMENTAL HERBICIDES, STATUS REPORT BY CROP, 1975.
7. Metodos: MANUAL DE METODOS DE INVESTIGACION DE MALEZA.
8. Methods Manual: WEED RESEARCH METHODS MANUAL.
9. PWOCA: MALEZAS PREVALENTES DE AMERICA CENTRAL/PREVALENT WEEDS OF CENTRAL AMERICA.
10. Tricks: ALGUNOS "TRUCOS" UTILES IN ESTADISTICA/SOME USEFUL TRICKS IN STATISTICS.
1. Tropical Weeds: TROPICAL WEEDS/MALEZAS TROPICALES.
2. Weed Seeds: SEMILLAS DE MALEZAS TROPICALES/TROPICAL WEED SEED SHEETS I and II.
3. Cool Climate: MALEZAS DE CLIMA FRIO/WEEDS OF A COOL CLIMATE.
4. Weed Problems of Turkey: WEED PROBLEMS OF TURKEY.

Country	Info- letter	Aquat. Equip.	Aquat. Weeds	Bibl.	Equip. Manual	Exper. Herb.	Meto- dos	Methods Manual	PWOCA	Tricks	Trop Weeds	Weed Seeds	Cool Clim.	Weed Prob. of Turkey
Canada	101	--	--	1	--	2	1	--	3	--	1	1	--	--
Canal Zone	4	--	3	--	--	--	--	--	--	--	--	--	--	--
Canary Islands	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Caroline Islands	1	--	--	--	--	1	--	--	--	--	--	--	--	--
Central African Republic	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Chad	3	--	--	--	--	--	--	--	--	--	--	--	--	--
Chile	37	--	--	1	--	1	1	--	2	--	1	3	--	--
Colombia	166	36	--	6	--	3	2	--	16	2	10	4	--	--
Comores Islands	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Costa Rica	54	1	2	1	--	3	1	--	42	6	9	1	--	--
Cuba	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Cyprus	3	--	--	--	--	--	--	--	--	--	--	--	--	--
Czechoslovakia	8	--	--	--	--	--	--	--	1	--	--	--	--	--
Dahomey	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Denmark	9	--	--	--	--	--	--	--	1	--	--	--	--	--
DDR	2	--	--	1	--	--	--	--	--	--	1	--	--	--
Ecuador	45	--	--	2	--	1	--	--	9	--	--	--	--	--
El Salvador	18	1	7	--	--	--	1	--	210	1	6	1	--	--
England	113	--	4	2	1	6	--	--	36	--	11	2	--	--
Ethiopia	20	--	--	--	--	--	--	--	--	--	--	--	--	--
Fiji	4	1	1	--	--	1	1	--	1	--	1	1	--	--
Finland	8	--	--	--	--	--	--	--	--	--	--	--	--	--
France	22	--	--	--	--	1	--	--	2	--	--	1	--	--
Gabon	1	--	--	--	--	--	--	--	--	--	--	--	--	--

Country	Info- letter	Aquat. Equip.	Aquat. Weeds	Bibl.	Equip. Manual	Exper. Herb.	Meto- dos	Methods Manual	PWOCA	Tricks	Trop Weeds	Weed Seeds	Cool Clim.	Weed Prob. of Turkey
Gambia	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Ghana	22	1	--	1	--	--	--	--	1	--	--	--	--	--
Greece	16	--	--	--	--	4	--	--	1	--	--	--	--	--
Guam	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Guatemala	29	--	--	2	--	--	--	--	99	--	1	100	--	--
Guinea	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Guyana	2	1	--	2	--	--	--	--	--	--	--	--	--	--
Haiti	3	--	--	--	--	--	--	--	1	--	--	--	--	--
Honduras	34	--	--	--	--	--	--	--	12	--	1	1	--	--
Hong Kong	4	--	--	--	--	--	--	--	--	--	--	--	--	--
Hungary	4	--	--	--	--	--	--	--	--	--	--	--	--	--
India	161	4	3	--	--	7	1	--	3	--	6	10	--	14
Indonesia	88	1	5	1	--	6	--	--	3	--	7	--	--	--
Iran	10	--	--	--	--	--	--	--	--	--	--	--	--	--
Iraq	2	1	--	--	--	--	--	--	--	--	--	2	--	--
Ireland	7	--	--	--	--	--	--	--	--	--	--	--	--	--
Israel	18	--	--	--	--	1	--	--	--	--	--	--	--	--
Italy	19	--	--	--	--	--	--	--	1	--	--	--	--	--
Ivory Coast	4	--	--	--	--	--	--	--	--	--	1	--	--	--
Jamaica	11	--	--	1	--	1	--	--	2	--	1	--	--	--
Japan	52	--	1	--	--	4	--	--	1	--	--	2	--	--
Jordan	7	--	--	--	--	--	--	--	1	--	--	--	--	--
Kenya	28	--	--	--	--	--	--	--	1	--	--	4	--	--
Korea	12	1	1	--	--	1	--	--	--	--	--	--	--	--

Country	Info- letter	Aquat. Equip.	Aquat. Weeds	Bibl.	Equip. Manual	Exper. Herb.	Meto- dos	Methods Manual	PWOCA	Tricks	Trop Weeds	Weed Seeds	Cool Clim.	Weed Prob. of Turkey
Laos	7	--	--	--	--	--	--	--	--	--	--	--	--	--
Lebanon	8	--	--	--	--	--	--	--	--	--	--	--	--	--
Lesotho	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Liberia	7	1	--	--	--	--	--	--	--	--	--	--	--	--
Libya	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Lagos	0	3	--	--	--	--	--	--	--	--	3	--	--	--
Malagasy Rep.	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Malawi	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Malaysia	56	1	5	--	--	3	--	--	2	--	4	2	--	13
Mali	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Malta	3	--	--	--	--	--	--	--	--	--	--	--	--	--
Mariana Islands	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Mauritius	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Mexico	126	1	6	6	--	1	4	--	167	--	24	2	--	--
Morocco	3	--	--	--	--	--	--	--	--	--	--	--	--	--
Mozambique	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Netherlands	15	--	--	--	--	--	--	--	3	--	2	--	--	--
New Caledonia	4	--	--	--	--	--	--	--	--	--	--	--	--	--
New Guinea	15	--	--	--	1	--	--	--	--	--	--	--	--	--
New Hebrides	2	--	--	--	--	--	--	--	--	--	--	--	--	--
New Zealand	21	--	--	--	--	2	--	--	--	--	--	--	--	--
Nicaragua	29	--	3	4	--	4	3	--	6	--	7	3	--	--
Nigeria	28	1	1	--	--	--	--	--	3	--	2	1	--	--
Norway	10	--	--	--	--	--	--	--	--	--	--	--	--	--
Pacific Islands	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Pakistan	14	--	--	--	1	--	--	--	--	--	--	--	--	--
Panama	26	--	--	1	--	--	--	--	52	--	--	--	--	--

Country	Info- letter	Aquat. Equip.	Aquat. Weeds	Bibl.	Equip. Manual	Exper. Herb.	Meto- dos	Methods Manual	PWOCA	Tricks	Trop Weeds	Weed Seeds	Cool Clim.	Weed Prob. of Turkey
Paraguay	9	---	1	---	---	---	---	---	2	---	1	2	---	---
Peru	74	---	---	1	---	2	1	---	10	---	1	---	---	---
Philippines	67	1	10	1	---	6	1	---	6	---	12	1	---	---
Poland	9	---	---	---	---	1	---	---	---	---	---	---	---	---
Portugal	5	1	---	---	---	---	---	---	---	---	2	---	---	---
Puerto Rico	17	---	1	11	---	1	1	---	9	---	9	---	---	---
Rhodesia	0	---	---	---	---	1	---	---	---	---	---	---	---	---
Romania	2	---	---	---	---	---	---	---	---	---	---	---	---	---
St. Lucia	1	---	---	---	---	---	---	---	---	---	---	---	---	---
Samoa	1	---	---	---	---	---	---	---	---	---	---	---	---	---
Saudi Arabia	6	---	---	---	---	---	---	---	---	---	---	---	---	---
Scotland	4	---	---	---	---	---	---	---	---	---	---	---	---	---
Senegal	11	---	---	---	---	---	---	---	---	---	---	---	---	---
Seychelle Isl.	1	---	---	---	---	---	---	---	---	---	---	---	---	---
Sierra Leone	4	---	---	---	---	---	---	---	---	---	---	---	---	---
Singapore	14	---	1	---	---	---	---	---	---	---	---	1	---	---
Solomon Isl.	2	---	1	---	---	1	---	---	---	---	1	4	---	---
South Vietnam	11	---	---	---	---	---	---	---	---	---	---	---	---	---
Spain	9	---	---	---	---	1	1	---	2	---	---	---	---	---
Sri Lanka	11	---	---	---	---	---	---	---	---	---	---	---	---	---
Sudan	9	---	---	---	---	---	---	---	---	---	---	---	---	---
Surinam	4	---	---	---	---	---	---	---	---	---	---	1	---	---
Swaziland	2	---	---	---	---	2	---	---	---	---	---	---	---	---
Sweden	13	---	---	---	---	---	---	---	2	---	---	---	---	---
Switzerland	27	---	---	---	---	2	---	---	23	---	---	---	---	---
Syria	2	---	---	---	---	---	---	---	---	---	---	---	---	---
Tahiti	3	---	---	---	---	---	---	---	---	---	---	---	---	---

Country	Info- letter	Aquat. Equip.	Aquat. Weeds	Bibl.	Equip. Manual	Exper. Herb.	Meto- dos	Methods Manual	PWOCA	Tricks	Trop Weeds	Weed Seeds	Cool Clim.	Weed Prob. of Turkey
Taiwan	18	2	--	--	--	1	--	--	1	--	--	1	--	--
Tanzania	12	--	--	--	--	1	--	--	1	--	--	--	--	--
Thailand	40	--	--	--	--	1	--	--	2	--	1	--	--	--
Togo	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Trinidad	15	--	--	--	--	--	--	--	3	--	--	--	--	--
Trucal States	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Tunisia	4	--	--	--	--	--	--	--	--	--	--	--	--	--
Turkey	16	--	1	--	--	--	--	--	3	--	1	--	--	--
Uganda	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Upper Volta	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Uruguay	18	--	--	1	--	--	1	--	--	--	1	--	1	--
USSR	4	--	--	--	--	--	--	--	--	--	--	--	--	--
United States	1,190	21	52	16	8	132	9	1	383	27	131	35	4	14
Venezuela	50	3	1	4	--	3	2	--	32	--	2	12	--	--
West Germany	38	--	1	--	--	2	--	--	87	--	4	--	--	--
Western Samoa	6	--	--	--	--	1	--	--	1	--	1	3	--	--
Yugoslavia	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Zaire	3	--	--	--	--	--	--	--	--	--	--	--	--	--
Zambia	8	1	--	--	--	--	--	--	--	--	--	1	--	--
TOTALS for 1975	3,873	127	184	114	12	298	107	1	1,354	38	351	297	6	41

APPENDIX III - PROJECT PERSONNEL

- ARNOLD P. APPLEBY, Corvallis, Weed Control Specialist, 25% FTE, April 1, 1975, to March 31, 1976.
- LARRY C. BURRILL, Corvallis, Weed Research Specialist/Support Agronomist, April 1, 1975, to March 31, 1976.
- DOLORES de CASANOVA, El Salvador, Secretary, April 1, 1975, to March 31, 1976.
- RICHARD L. CHASE, El Salvador, Weed Research Specialist, April 1, 1975, to March 31, 1976.
- TRACY COLBY, Corvallis, Secretary/Publications Specialist, 60% FTE, April 1, 1975, to September 11, 1975.
- ALLAN DEUTSCH, Corvallis, Information/Administration, April 1, 1975, to March 31, 1976.
- HERBERT H. FISHER, Brazil, Weed Research Specialist, April 1, 1975, to March 31, 1976.
- FRANK FRASER, Corvallis, Technician, April 1, 1975, to March 31, 1976.
- ELIZABETH JAMISON, Corvallis, Secretary, October 28, 1975, to March 31, 1976.
- GEORGENA S. KNAPP, Corvallis, Fiscal/Translation, April 1, 1975, to March 31, 1976.
- EDUARDO LOCATELLI, Corvallis, Weed Research Specialist, June-July 1975.
- STANLEY F. MILLER, Corvallis, Director and Agricultural Economist, April 1, 1975, to March 31, 1976.
- MYRON SHENK, Brazil and Corvallis, Weed Research Specialist, April 1, 1975, to March 31, 1976.
- MYRNA WADE, Corvallis, Secretary, April 1, 1975, to March 31, 1976.
- DOUGLAS L. YOUNG, Brazil and Corvallis, Agricultural Economist, April 1, 1975, to March 31, 1976.
- MARIA TERESA WALDRON, Corvallis, Clerical Assistant, August 25, 1975, to February 20, 1976.