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1970-71

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Regional Contract

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"Weed Control in Less Developed Countries"

The International Plant Protection Center
associated with the
Department of Agronomic Crop Science

Oregon State University

Corvallis, Oregon 97331 / USA

OSU/AID Report 72-1



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FOREWORD

The 1970-71 year was the most productive to date in the 5-year life of the USAID/Oregon State University weed control research project. This was primarily a result of having three full-time professional staff located in Latin America long enough to develop highly productive programs.

The enthusiasm and support of in-country agricultural ministries, universities, USAID missions, and professional counterparts was especially stimulating to our entire staff.

Project back-up staff in Oregon and Hawaii has also matured and had time to develop needed research, literature, and services to optimize usefulness of the project to developing countries.

A conscious attempt was made in 1970-71 to increase in-country operations with some reduction of home-based research activity. This trend will continue in 1971-72, since the greatest research payoff for developing countries results from staff members functioning on the ground in those countries.



**Lyall F. Taylor
Acting Director**

1 HIGHLIGHTS 1970-71

Dr. Juan Cárdenas returned to Oregon following four years of successfully directing the research program in Colombia. He will continue to be involved with administration of the project in Latin America as well as supervising several advanced degree candidates from developing countries working in weed control research at Oregon State University. During these four years, the host country agricultural organization, Instituto Colombiano Agropecuario (ICA), continued developing competence in weed control research building a staff of 17 professional counterparts and programs at 15 locations throughout Colombia.

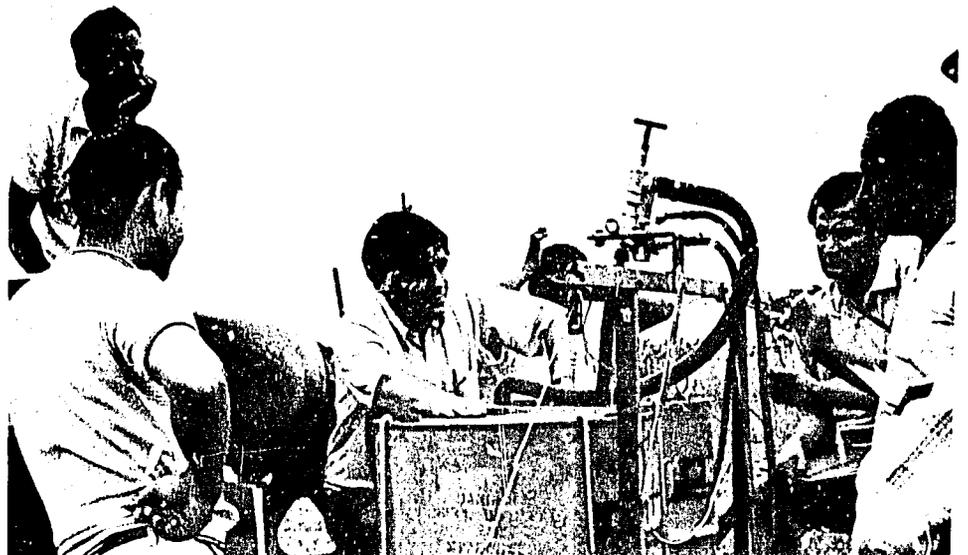
A cooperative effort in extension weed control activities in Colombia was led by Dr. Jerry Doll, a Peace Corps volunteer. Emphasis was placed on published weed control recommendations, field days, and short courses. Extension is an essential function if research results are to be translated from written words to an improved agriculture.

At the request of USAID/Washington, Drs. Cárdenas and Doll presented one and two day short courses in weed control research in Brazil, Paraguay, Bolivia, and Peru. Dr. Cárdenas also made three working trips to Peru to assist institutions there with designing weed control research, especially for rice crops.

In Central America, Mr. Lupe García continued to coordinate research programs in El Salvador, Costa Rica, Guatemala, Honduras, and Nicaragua while based at Santa Tecla, El Salvador. The program in Central America has developed very rapidly, partly because all five countries recognized the need for, and carried out the appointment of, competent local research counterparts.

Mr. Myron Shenk, regional project leader headquartered at Guayaquil, Ecuador, completed his first full year helping to develop research competency in both Ecuador and Panama. Strong support from the local

Students at a week control short course in Ecuador question Dr. Juan Cárdenas (center) about operation of spray equipment.



government organizations (INIAP in Ecuador, and the National University and Ministry of Agriculture in Panama) was a vital factor behind the establishment of over 50 research trials during the year.

Two publications needed for guidance of weed control research workers in developing countries were completed, published, and widely disseminated during the year. The HERBICIDE USE AND NOMENCLATURE INDEX contains tables of common and trade names for herbicides, plus a guide to herbicide usage for 68 major food and fiber crops. The WEED RESEARCH METHODS MANUAL was written to provide guidance on techniques of conducting weed control research programs. Additional books on weed identification in Latin America and pesticide application equipment are nearing completion.

Testing programs with new herbicides were continued in Oregon and Hawaii under the direction of Mr. Larry Burrill. These tests provide much-needed information to assist research workers in developing countries relative to which chemicals might best be utilized in their programs. This information is revised and published annually as EXPERIMENTAL HERBICIDES, STATUS REPORT BY CROP.

PUNTOS IMPORTANTES DEL PROYECTO 1970-71

El Dr. Juan Cárdenas regresó a Oregon después de cuatro años, durante de los cuales dirigió con éxito el programa de investigación en Colombia. Sigue desempeñándose tanto en la administración del proyecto de Latinoamérica como en la supervisión de estudiantes post-graduados de países en desarrollo que realizan investigaciones en malezas y su control en la Universidad Estatal de Oregon. Durante los cuatro años pasados el Instituto Colombiano Agropecuario (ICA) desarrolló competencia en investigaciones de control de malezas, formando un grupo de 17 profesionales distribuidos en 15 zonas del país.

Un esfuerzo cooperativo en actividades de extensión en control de malezas en Colombia fue dirigido por el Dr. Jerry Doll, un voluntario del Cuerpo de Paz. Se puso énfasis en recomendaciones publicadas sobre control de malezas, en días de campo, y en cursos cortos. La extensión es la función más importante para poner los resultados de investigación al uso del campesino.

Al pedido de USAID/Washington, los Drs. Cárdenas y Doll presentaron un serie de cursos cortos en investigación en control de malezas en el Brasil, Paraguay, Bolivia y el Perú. Además el Dr. Cárdenas hizo dos viajes de trabajo al Perú para prestar asistencia técnica al Programa Nacional de Arroz del Ministerio de Agricultura.



At one of the ICA-sponsored field days during 1971 Dr. Jerry Joff emphasized a point about weed control.

En la América Central, el Ing. Lupe García continuó coordinando programas de investigación en El Salvador, Costa Rica, Guatemala, Honduras y Nicaragua. Su base de operación está localizado en la estación experimental de Santa Tecla, El Salvador. El programa en Centroamérica se ha desarrollado rápidamente, debido en parte a que los cinco países reconocieron la necesidad del control de malezas y nombraron competentes investigadores locales como cooperadores.

El Ing. Myron Shenk, director del proyecto regional, con base en Guayaquil, Ecuador, cumplió su primer año, ayudando a desarrollar competencia en investigación en Ecuador y en Panamá. El apoyo fuerte de las organizaciones gubernativas (INIAP en Ecuador, y la Universidad Nacional y el Ministerio de Agricultura en Panamá) fue un factor de gran importancia en el establecimiento de más de cincuenta ensayos de investigación durante el año.

Se completaron dos publicaciones para el gobierno de trabajadores en investigaciones en control de malezas en países en desarrollo. Estas se difundieron ampliamente. El libro, **HERBICIDE USE AND NOMENCLATURE INDEX**, contiene listas de nombres comunes y comerciales de herbicidas, más una guía para el uso de herbicidas en 68 importantes cultivos de consumo humano y fibras. La otra publicación, **WEED RESEARCH METHODS MANUAL**, fue escrito para dar una pauta sobre los métodos de conducir programas de investigación en control de malezas. Otros libros sobre identificación de malezas en la América Latina y sobre equipo para aplicar pesticidas están próximos a publicarse.

Programas de probar nuevos herbicidas se continúan en Oregon y en Hawaii bajo la dirección del Ing. Larry Burrill. Estos ensayos proveen información necesaria para ayudar investigadores en países en desarrollo sobre productos químicos experimentales. Esta información es revisada y publicada anualmente en el informe, **EXPERIMENTAL HERBICIDES, STATUS REPORT BY CROP**.



The June 28th field day at San Andres, El Salvador, concentrated on research to control nutsedge in corn. Attending the event (left to right): Hugenio Salazar Beneke, DGIEA Director (Santa Tecla); J. P. Derum, USAID Mission Director for El Salvador; Enrique Alvarez, Minister of Agriculture for El Salvador; and Lupe Garcia, USAID/OSU regional project leader.

2 OVERSEAS RESEARCH

Central America

The first full year of project presence in Central America witnessed an increase in activity as five nations—El Salvador, Costa Rica, Guatemala, Honduras, and Nicaragua—commenced cooperative weed control research programs. At least one project research counterpart has been appointed by cooperating institutions in each country.

El Salvador

In El Salvador, several trials were established during the year including upland rice, peanuts, grain sorghum, cantaloupes, field beans, corn, carrots, tomatoes, and cotton. Several of these were secondary trials and in all cases, where possible, information obtained from primary trials conducted at Oregon State University or the University of Hawaii formed the basis for designing the local research.

The Salvadorean research program is now being carried out by a new counterpart, Ing. Juan Ramon Uriarte. DGIEA (Dirección General de Investigación y Extensión Agropecuarias), the cooperating institution in El Salvador, also appointed Cesar Augusto Urquilla as assistant weeder to work with Ing. Uriarte.

Costa Rica

Trials in several crops were established in Costa Rica during 1970-71 at the Alajuela Experiment Station as well as at Golfito and Parrita. Included were: cucumbers, upland rice, beans, and peanuts. Trials were also initiated in brush control and pastures.

Counterpart for the project in Costa Rica, Primo Luis Chavarría, has now been joined by Efraín Sancho, named as a counterpart by the Ministry of Agriculture. Weed control research has been divided, with the Ministry working in crops grown in the Pacific and Atlantic coastal areas and the University concerning itself with crops grown in the Meseta central area.

Guatemala

During the months of May and June 1971, a rice trial was established in the Lake Izabal area of Guatemala on the Atlantic side of the country. Earlier a trial for nutsedge control in corn was launched at the Cuyuta Experiment Station.

Another significant step taken during the year was the naming of Ing. Luis Manlio Castillo as a full-time counterpart for the weed control program. A third-year student, Francisco Rodríguez, became assistant weeder to work with Ing. Castillo.

Honduras

Though research in Honduras was somewhat limited during the year, two trials were established, and plans formulated to put out additional trials at the Danlí, Comayagua, and San Pedro Sula research stations. The program in Honduras also moved forward with the selection of Ing. Moisés Mojica as counterpart and Roberto Banegas as assistant weeder.

Nicaragua

Early in the report year Segundo Espinosa was named full-time counterpart for the weed control program in Nicaragua. There followed a disheartening experience of establishing a trial in beans only to see it destroyed by insects and diseases caused by a lack of sufficient budget for needed protective measures.

The situation improved when the Minister of Agriculture authorized funds to purchase the needed supplies to implement field research. Subsequently trials were begun at the La Calera, Campos Azules, León, and Rivas experiment stations.

Honduran weed researcher Moisés Mojica uses a compact CO₂ manual sprayer to establish a test plot.





At the Pichilingue Tropical Experiment Station, Ecuador, Dr. Marcelo Ruiz of INIAP (left) and USAID/OSU regional project leader Myron Shenk check on a student's laboratory experiment.

General Programs in Central America

In addition to trial work, six student thesis problems are either being directly advised by Mr. Lupe García, regional project leader, or by project counterparts in the various countries.

A project to identify and describe important weeds in Central America was initiated with a goal of publishing an identification manual by 1972.

Ecuador/Panama

Ecuador

Despite historic floods in Ecuador during the year that all but cancelled field research in some areas, progress was achieved in that the number of experiment stations with ongoing weed research programs has expanded to five: Boliche, Pichilingue, Santo Domingo, Santa Catalina, and Daule.

All work is a joint effort between INIAP (Instituto Nacional de Investigaciones Agropecuarias) and the project. INIAP staff members assigned full-time to weed research include Dr. Marcello Ruiz (who is also in charge of the cacao research program), Ing. Francisco Gabela, Ing. Daniel Navia (on leave in Mexico), Ing.

Eloy Salazar, and Ing. Julio Cascante. There are also several thesis students assisting in various phases of the program.

Regional project leader Mr. Myron Shenk has devoted significant time to advising university students on thesis problems, research techniques, and directly assisting with field research activities.

Several experiments related to weed control in cacao were underway at the end of the year including a cost analysis study of weed control methods in cacao, new herbicides in young cacao, and a selectivity study for shade trees used in cacao culture. A thesis student



INIAP weed researchers collect weed specimens at the Daule, Ecuador, experiment station.

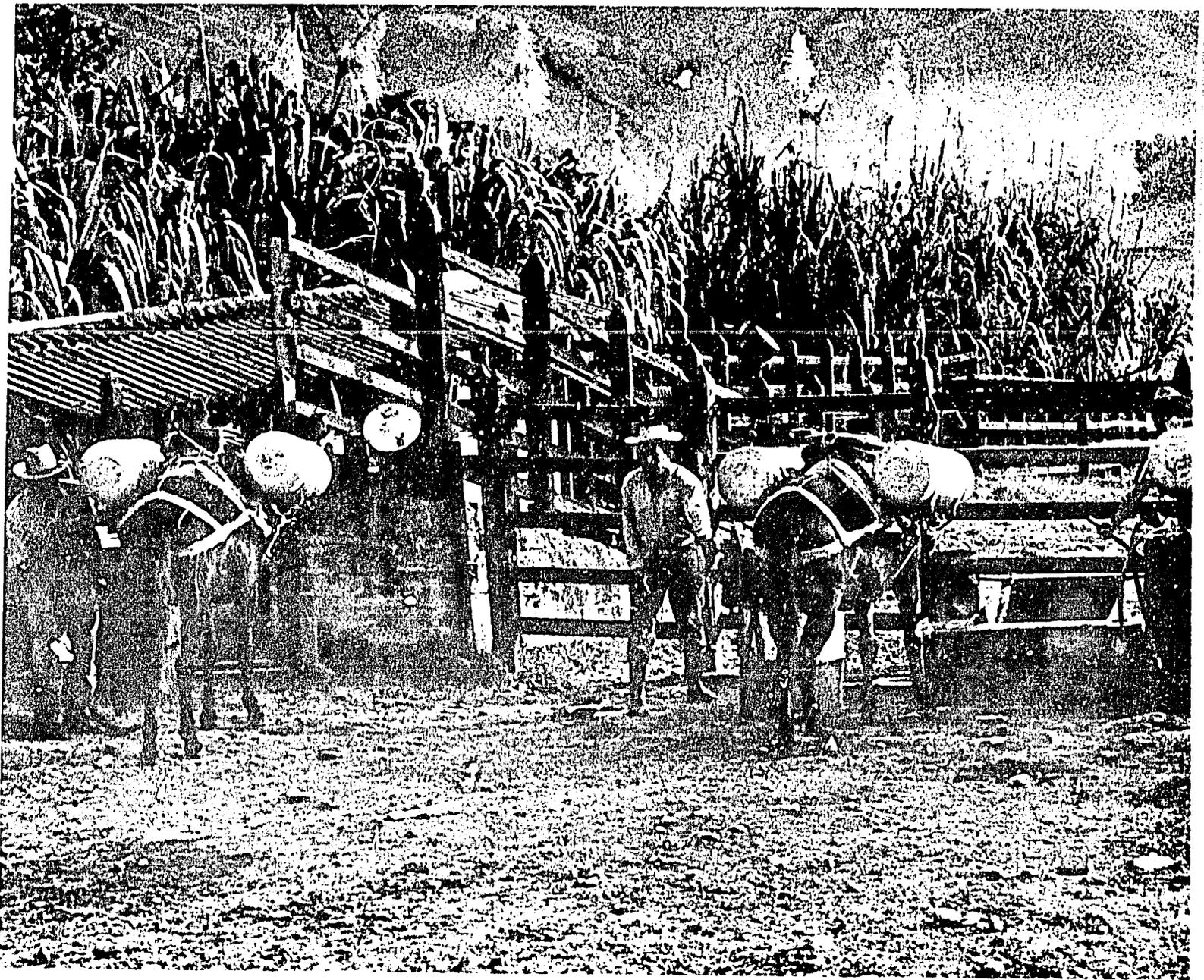
is investigating the physiological response of cacao to several herbicides.

In total, there were 36 various experiments, including the cacao work mentioned above: five projects involved corn, nine were rice experiments, two were major projects in nutsedge, and one that is an extended trial in pastures. Additionally, work related to Pueraria establishment is underway at Pichilingue. Pueraria is used in African oil palm culture as a ground cover; it is an extremely slow-growing legume that requires up to three months for establishment, during which time it is susceptible to intense weed competition.

Other efforts include a herbicide selectivity study in year-old African palm seedlings, a general weed control program in established palm, and an investigative study on the control of wild cucumber that is invading a commercial plantation adjacent to the INIAP station at Santo Domingo.

Panama

Approximately 20 research trials have been established at five locations in cooperation with the National University and the Ministry of Agriculture. At the University station at Tocuman, a special study is underway



in the control of *Manisuris*, or Rottbollia, in corn. The University program is under the leadership of Professor Ezequiel Espinosa.

One of Professor Espinosa's students is investigating the use of herbicides on a local variety of bean as a thesis project. No previous research on chemical weed control is known for this economically important crop in Panama.

At the Davisa station, several experiments with rice were in progress, plus one on beans, when the floods also hit Panama. The rice work escaped destruction, but the bean plots were a literal washout.

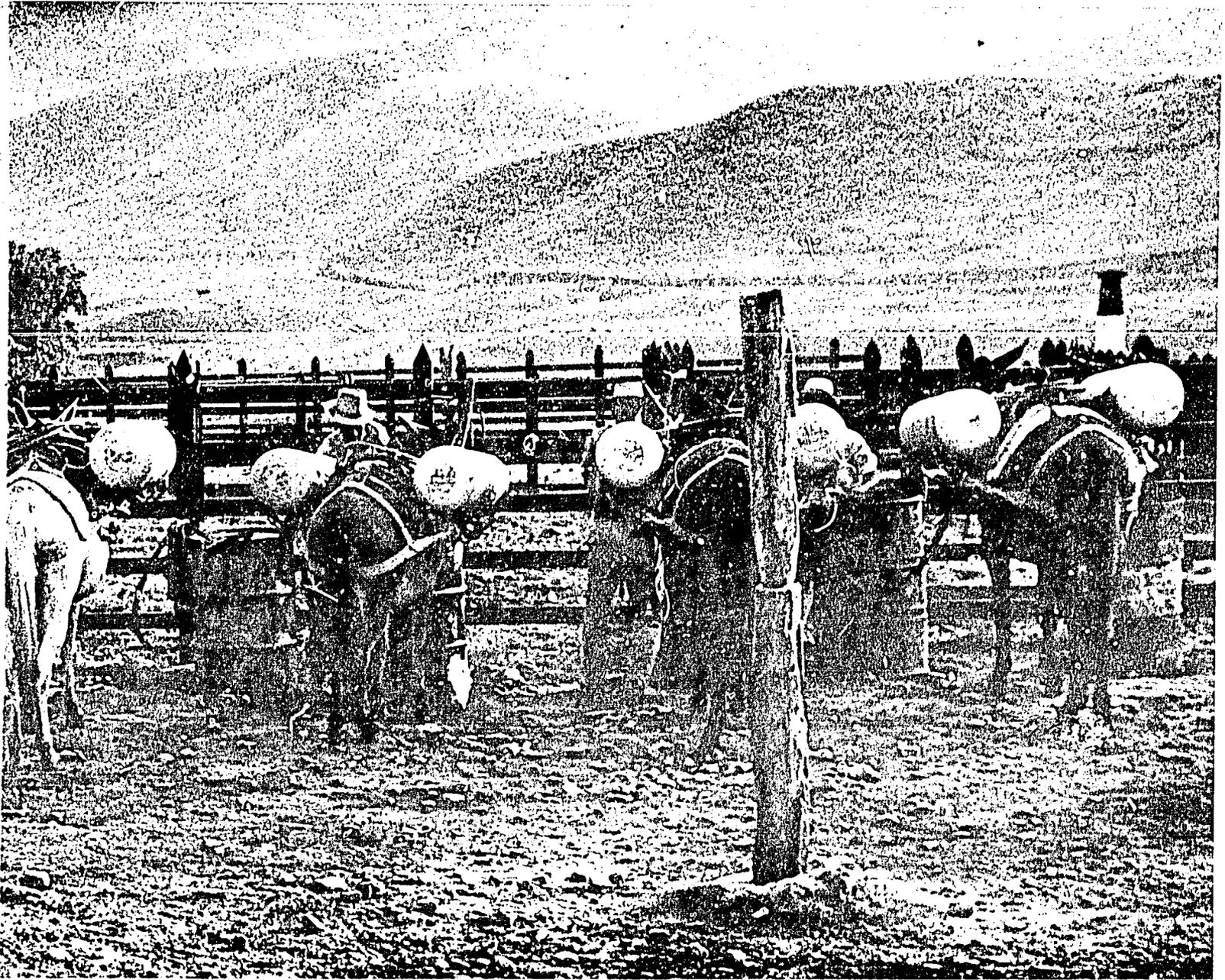
A large horticulture screening experiment was performed at the Cerro Punta station along with a soil residue study. Victoriano Ríos, on the Ministry of Agriculture staff, has been assigned to Cerro Punta and will be working part-time with weed research. At David, the

project is continuing to cooperate with the FAO pastures program. A new experiment station under the Ministry of Agriculture has been added at Peonome with provision for weed research.

Colombia

The thrust of project activity, in transition during 1969-70, had shifted from emphasis on research to emphasis on dissemination and application of the data developed by weed control research. But research was far from moribund as investigations by the Instituto Colombiano Agropecuario (ICA) were actively pursued at 15 sites and experiment stations. Over 1,000 weed control trials were conducted in Colombia between 1967 and 1971, involving most commercial crops.

While regional project leader Dr. Juan Cárdenas devoted an increased percentage of attention to semi-



A team of "one horsepower" sprayers prepares for weed control work in Colombian mountain pasture lands.

nars in Brazil, Paraguay, and Bolivia plus a training course in Peru, 17 counterparts—associated with ICA and other organizations—carried on research, both on special projects such as herbicide/insecticide compatibility studies and on broader programs as characterized by the pasture improvement program (in conjunction with Dr. Thomas Fullerton of the USAID/University of Nebraska group).

Dr. Michael Bristow, also of USAID/Nebraska, and Dr. Cárdenas worked closely with ICA and INCORA (Agrarian Reform Institute) personnel to set up a research effort on aquatic weeds.

3 BACK-UP RESEARCH AND ASSISTANCE, OREGON AND HAWAII

Technical Support

Intensive weed control research is a relatively young discipline; new developments in techniques, equipment, and materials occur frequently as the state of the art continues to evolve. Hence, a critically important facet of the USAID/OSU project is to provide in-field staff with ready access to current information, not only from a purely technical consideration, but also for the psychological feeling of being kept in touch.

Project back-up support has been organized in a flexible manner to allow prompt response to requests from the field and includes a broad range of activities.

Evaluation of new herbicides has been an important part of the total weed control program at Oregon State University for many years resulting in a unique association with the world's major chemical companies. Example: while financial support for herbicide screening in 1970 decreased at many universities, it increased at OSU. The herbicide screening program is primarily supported by industry funds; it helps provide useful information and industry contacts for in-field staff.

While experimental herbicides do not, and should not, receive major attention from in-field staff, it is becoming increasingly common to have herbicides sold outside the U.S. prior to being marketed in the U.S. Maintaining close contact with the manufacturers helps back-up staff keep the field staff alerted and more effectively prepared for developments in commercial weed control products.

A continuing and successful weed control research program should test and evaluate the most promising new herbicides available for a given crop. Each year the USAID/OSU project prepares and publishes **EXPERIMENTAL HERBICIDES, STATUS REPORT BY CROP**, in which new herbicides are listed for many economically important food and fiber crops. The lists are arranged so that a researcher may select only the most promising herbicides if he prefers. Although prepared initially for project field staff, the Status Report has been sent by request to many other weed control researchers throughout the world; 350 copies of the 1971 report were distributed in 35 countries.

Information

The important function of supplying technical information to the field is based on information gathering. For specific requests, literature reviews are performed, supplemented by current information developed from direct contact with other researchers, industry representatives, and attendance at professional meetings and field days.

Among other valuable sources of information is the extensive exchange of publications with many other domestic and international weed control research programs. As an example, a recent report on nutsedge control in Tanzania was received; copies were immediately forwarded to project staff members in the field since this is a severe and expanding tropical weed problem.



Visitors to the annual weed control field day at Corvallis, Oregon, toured research plots via tractor-pulled trailers.

Researchers and industry representatives from many countries regularly visit Corvallis and provide yet another excellent source of current information.

A cooperative weed control research program with the University of Hawaii is in its seventh year. The first five years involved only new herbicide screening and were supported entirely by chemical company funds. The program was expanded in 1969 to encourage research in support of staff working in LDCs.

Activities in Hawaii

Testing of herbicides under the subtropical Hawaiian conditions makes a valuable contribution to the overall program, since the climate and types of weeds in Hawaii are very similar to those of many developing countries. Of particular value, a paddy crop research and training station has been developed by the staff of the University of Hawaii (with rice and taro the main crops studied) providing a vehicle for weed control research on paddy and tropical crops.

In the past year several other project-related research efforts received attention by University of Hawaii researchers:

- a. Use of urea fertilizer as a carrier for 2,4-D for weed control in flooded rice: a report on this research was published in the Proceedings of the 3rd Asian-Pacific Weed Control Conference.
- b. Detailed tests with three promising new herbicides for direct-seeded rice: this work resulted in a paper for the 3rd Asian-Pacific Weed Control Conference.
- c. Weed control in taro grown under both paddy and upland conditions.
- d. Screening of new herbicides for use on paddy rice.
- e. Seed pelleting as an approach to herbicide selectivity in direct-seeded rice.
- f. Advanced field studies with the herbicide Amiben for weed control in rice, resulting in a paper published in the 10th British Weed Control Conference Proceedings.

Weed control research in tropical pasture and range land has received major attention at Hawaii this year, including indexing of commercial herbicides for tropical and temperate pasture legumes and grasses. A program on jungle clearing, and reseeding to pasture species, continues to yield useful information.



Larry Burrill (left) and Frank Fraser of the USAID/OSU weed control research project take note of test plots at Corvallis.

Commercial corn and sorghum production is underway in Hawaii, offering an excellent opportunity for research on weed control problems in these crops under tropical conditions. Of special interest this year is weed control in ratoon sorghum production; this is a commercial practice in Hawaii and weed control trials are underway. Mr. Garcia has expressed interest in doing the same type of research in Central America and thus time and effort will be saved as a result of the work in Hawaii.



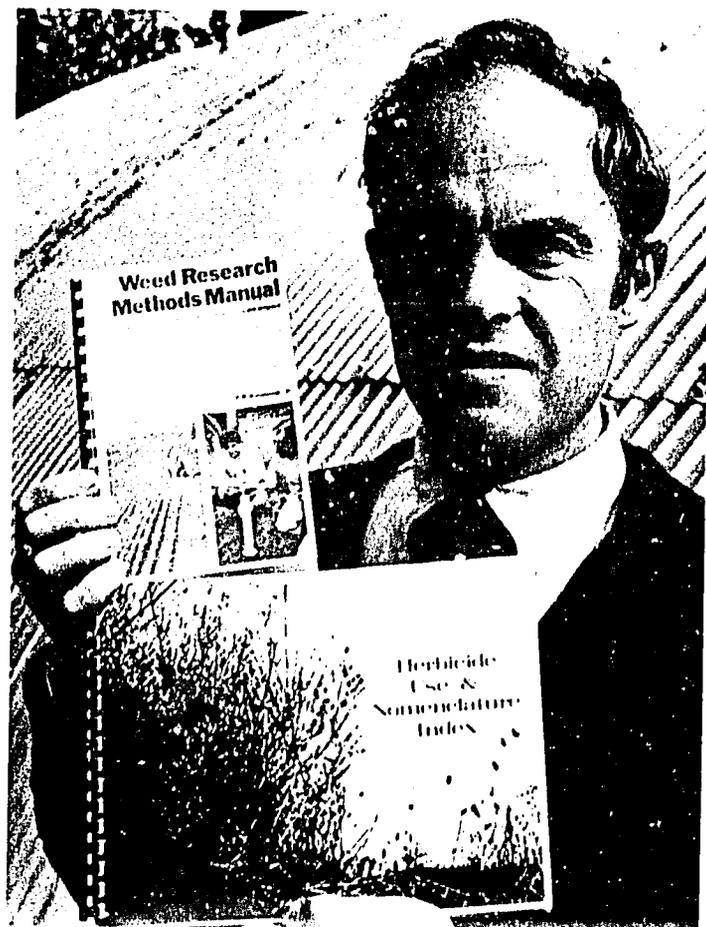
Dr. Ramón de la Peña (left) and Larry Burrill, with Dr. Santiago Obien (standing), observe weed control research in rice at the Kauai (Hawaii) Branch Experiment Station.

Publications from Corvallis

Two major reference books for weed control research were published at Corvallis during the year: **HERBICIDE USE AND NOMENCLATURE INDEX** and **WEED RESEARCH METHODS MANUAL**. While funds for actual publication came from other than USAID/OSU project sources, project personnel were intimately involved with both volumes.

The **HERBICIDE USE AND NOMENCLATURE INDEX**, or "HUNI," combines tables of common and trade names for all known world herbicides, plus a section of herbicide use for 68 major food and fiber crops. It clearly states that the latter section does not comprise recommendations, but offers material of use to personnel involved with research and serves as a starting point for conducting further experiments.

"A handbook of weed control research techniques and methods with emphasis on establishing new programs," is the subtitle of the **WEED RESEARCH METHODS MANUAL**. Sections cover subjects such as: how to design experiments; cultural practices related to weed control research; methods of applying test materials; safety in the use and handling of herbicides; research equipment; techniques of evaluating research; plus a series of appendixes with conversion tables, equivalents, rates, and literature references.



Two key weed control publications issued during 1971, the **HERBICIDE USE AND NOMENCLATURE INDEX** and **WEED RESEARCH METHODS MANUAL**, are displayed by Allan Deutsch, project information specialist at Corvallis.

Copies of both "HUNI" and the "Methods Manual" have been made available for distribution to AID missions worldwide as well as to many researchers and institutional personnel in developing countries.

In addition to EXPERIMENTAL HERBICIDES, STATUS REPORT BY CROP (see page 12), the project, in conjunction with the International Plant Protection Center, continued to publish and distribute INFOLETTER, a periodical news communication related to weed control. The three issues during the year carried information on various aspects of the USAID/OSU project; weed control research in developing countries; information on weed control equipment; listings of professional meetings; plus extensive coverage of publications—and how readers could obtain more information about them.

INFOLETTER was redesigned this year with a 30 percent increase in copy space and a more contemporary format. The mailing list was expanded to include over 2,000 names representing 109 countries. Requests from personnel in developing countries to be added to the INFOLETTER mailing list continue to be received and serviced.

One additional manual, on pesticide application equipment suitable for small farms and research workers, is nearing completion and is planned for publication during 1971-72.

(Information on publications originating from host countries starts on page 16.)

Information Storage and Retrieval

Since herbicides have become so widely used for weed control, it has become almost impossible to store and be able to manually retrieve all the data on crop response, weed response, and soil residual life of each compound. Because of the importance of this task, a complete electronic data processing system was developed for use by the USAID/OSU weed control project in 1969. This system continues to be used, with gradual refinements.

Several other weed research organizations have been simultaneously developing EDP systems. Because of the great need to have a standardized system which could be utilized by many researchers, the Weed Science Society of America now has a special committee assigned to developing such a system. The USAID/OSU project is represented on that committee and is providing wholehearted encouragement and support to development of a useful national and/or international system.

If this system is developed as expected, it will be possible, as an example, to get an immediate computer print-out of all herbicides which have given a high degree of control of a specific weed, such as purple nutsedge, in a specific crop, such as beans, based upon tests conducted by all contributing researchers in the WSSA.



International visitors take a first hand look at weed research plots near Oregon State University, Corvallis.

4 RESEARCH UTILIZATION

Research alone cannot achieve improved agricultural production, but must be translated into actual methods, that is, applied to the crops of a region. For this key reason, a secondary but important function of the USAID/OSU project is assisting in the application and utilization of weed control research.

Activities involving project personnel—field days, publications, extension—are entirely channeled through existing host country institutions. ICA in Colombia, INIAP in Ecuador, and DGIEA in El Salvador have been the primary organizations carrying out a cooperative program of weed control research extension.

Publications

The project's regional leader in Colombia, Dr. Juan Cárdenas, assisted ICA in the preparation, publication, and dissemination of weed control recommendation bulletins. Four of these concise, illustrated sheets were issued in 1969-70; ten more were printed this year covering either weed control for a specific crop, or practices for controlling a specific, economically important weed. (See list of publications inside back cover.)

Following-up the publication of MALEZAS DEL CLIMA FRIO (WEEDS OF THE COOL CLIMATE) in Spanish last year, the project and ICA prepared similar material on tropical weeds for issue late in 1971. TROPICAL WEEDS/MALEZAS TROPICALES will contain full-color plates and detailed descriptions in English and Spanish of 150 important weeds. It is anticipated that this information will have wide application throughout Latin America and the Caribbean. Local research institutions and world industry are providing the bulk of the financial support for publication.

A companion publication on aquatic weed identification is also currently in preparation, and is expected to fill a major gap in research needs for Latin America.

In El Salvador, DGIEA issued a publication devoted to the control of nutsedge, based on a manuscript by staff members in collaboration with regional project leader, Mr. Lupe García.

The publication WEED RESEARCH METHODS MANUAL, published by IPPC at Corvallis, has been

Professor Ezequiel Espinosa (center, white shirt), Faculty of Agronomy, University of Panama, inspects a weedy vegetable crop in Cerro Punta, Panama.

selected by the USAID Regional Technical Aids Center (RTAC) in Mexico for translation into Spanish. RTAC plans to print 3,000 copies and make them available without cost to all USAID missions in Latin America for distribution within their respective host countries.

**Dr. Juan Cárdenas (front) and
Ing. Francisco Gabela, INIAP,
collect and photograph weed
specimens at the INIAP research
station, Cuenca, Ecuador.**





The younger generation (in background) observes as Dr. Juan Cárdenas (left) and participants at an Ecuadorian short course calibrate a sprayer.

A researcher at the Tocumen, Panama, station instructs technicians in the use of spraying equipment.



Extension/Field Days

Dr. Jerry Doll, a Peace Corps Volunteer weed specialist assigned to ICA, worked with ICA staff and Dr. Cárdenas to organize a series of weed control field days at various research stations throughout Colombia. Over 1,000 people attended the field days held during 1970-71. The successful cooperation between Dr. Doll and Dr. Cárdenas and host institutions has precipitated a similar program in Central America where a PCV has been assigned to DGIEA in El Salvador to work with Mr. García.

In Central America field days played an important role during the second year of project operation. Working closely with DGIEA in El Salvador Mr. García provided assistance at the following events:

July 3, 1970—a weed control field day was held at the San Andrés research station for extension agents, farmers, agricultural credit personnel and DGIEA research staff. Ex-

periments in upland rice, field beans, maize, and other work were viewed; a demonstration of calibrating spraying equipment was also presented.

August 20, 1970—the entire afternoon of a field day focusing on melon production was devoted to weed control.

August 28, 1970—two classes of Agronomy students at the University of El Salvador traveled to San Andrés for a similar session as the one held on July 3.

July 28, 1971—70 extension agents and farmers from commercially important agricultural regions attended a weed control field day at San Andrés to observe experiments in field beans and nutsedge control in maize.

A major field day held by INIAP (Ecuador) involved weed control. A smaller-scale event, a pasture field day also sponsored INIAP, touched on aspects of weed control. USAID/OSU project leader Mr. Myron Shenk played a role in both events.

Short Courses/Seminars

In-field project staff members have assisted in the organization, and participated in the presentation, of several weed control short courses in Latin America. 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. The courses were well accepted and attended by local experiment station researchers, technical advisors, Peace Corps volunteers, and farmers.

Dr. Cárdenas traveled to Peru during 1971, on request of the Peruvian government, to accept a temporary assignment training Peruvian personnel in weed control research methods.

Mr. Shenk, along with INIAP personnel, devoted one morning a week for ten weeks to a series of weed control sessions presented to future agricultural specialists. He also took part in the weed control segment of a rice training program sponsored by the Rice Cooperatives in Ecuador.

In addition to a two-day short course in weed control presented to 65 Salvadorean extension agents, Mr. García also took part in a similar event in Costa Rica sponsored by the Ministry of Agriculture. A variety of basic principles, methods, techniques, and safety precautions was covered in each course.

A series of one-day seminars on weed control was also arranged and held in conjunction with Ministries of Agriculture, local research and educational institutions, and USAID Missions in Paraguay, Brazil, Bolivia, and Peru.

Weed Control Organizations

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 now inspired an Indonesian and a Malaysian society. These societies have been most helpful in focusing on the importance and needs of weed control in these areas. They are the one means of



USAID/OSU regional project leader Lupe García points out variations in nozzle spray patterns during a field day in El Salvador.

bringing University, government, and industry researchers together, to exchange information and plan more efficient weed control research, teaching, and extension programs.

In addition to attending a number of meetings of the above-named groups and presenting research findings, project staff have also delivered papers at other worldwide meetings including the East African Weed Conference, Weed Science Society of America, British Weed Conference, and others.

**Attendees at a short course
in Lima, Perú, listen to
Dr. Juan Cárdenas discuss
weed control research methods.**



**Peace Corps volunteer Dr. Jerry Doll (right, center) reviews information
with participants at a Colombian weed control field day.**



5 FEEDBACK

One tangible indication of impact and utilization of an activity is the feedback from the field. Several letters received by the USAID/OSU weed control project follow.

ESTADOS UNIDOS
DE AMERICA
REPUBLICA ARGENTINA



TELEF 204-0107

IMPORTACIONES EXPORTACIONES

Adrogá, December 3rd. de 1970.

Mr. Allen Deutch,
Information Services,
International Plant Protection Center,
Oregon State University,
Corvallis, Oregon, 97331, U.S.A.

Dear Mr. Deutch,

We very much appreciate your kindness in writing us. Your letter dated on November 23rd was certainly a most profitable one, particularly because of the information provided in it, as well as Mr. Mitidieri's address.

It has been a pleasure for us to contact you, and we expect to maintain our connection in the future.

Thanks again,

Yours sincerely,

Carlos Alberto Basso
Carlos Alberto Basso



UNIVERSIDAD DE PANAMA
FACULTAD DE AGRONOMIA
APARTADO 200
PANAMA 4, PANAMA

July 6, of 1971.

Information Services, Desk 2
International Plant Protection Center
Oregon State University
Corvallis, Oregon 97331
U.S.A.

Gentlemen:

I would appreciate very much if you would send me a copy of "Herbicide Use and Nomenclature Index" by H.H. Hopworth and R.R. Fine and at the same time ask you to include me in your mailing list for any future publications of IPPC and your infoletter.

Your publications will be of great help in my classes as well as my research.

Sincerely yours,

César Von Chong H.
César Von Chong H.
Professor

CVCR/am.



BALAI PENELITIAN PERKEBUNAN
M E D A N

Phone : 20714-20715-20716
Cable : KIRPA, Medan

Address : P.O. Box 104
Medan, INDONESIA

Our ref. : 3189/22a/71

Re: -

Subj. : PPO-YORHA

Medan, 5th July 1971

International Plant Protection Center
Information Service
Oregon State University
Corvallis, OREGON 97331
U. S. A.

Dear Sirs,

Reference to your "Infoletter" IPPC No.5/April 1971, we would like to request your help in sending us the under-mentioned publications :

1. Furtak, V.R. & R.R. Romanowski Jr.
Weed Research Methods Manual, with emphasis on establishing new programs.
2. F.A.O.
Crop loss assessment Methods FAO manual on the evaluation of losses by pests, diseases and weeds.
FAO, Rome 1970 AGP : CP/22.
3. IPPC
Spraying equipment for use in research, demonstrations, and small plots.
4. Hopworth, H.H. and R.R. Fine
Herbicide use and nomenclature index.

Please, bill us and send invoice in duplicate.
Thanking you in advance,

BBI/th



WEED SCIENCE SOCIETY OF AMERICA

2183 McCarty Hall • University of Florida • Gainesville 32601 • Telephone 904/392-1873

Editor and Vice President
EARL G. RODGERS

July 27, 1971

Mr. Allen Deutsch
International Plant Protection Center
Oregon State University
Corvallis, Oregon 97331

Dear Mr. Deutsch:

Thank you for your letter of July 9 and the copy of the WEED CONTROL RESEARCH METHODS MANUAL. I have reviewed this manual briefly and find that it contains much information that will be especially helpful to the beginning researcher in weed science; it will serve as an excellent reference also to the established weed scientist.

Assuming it meets your approval, I will plan to announce the availability and price of this manual in the News Notes column of the November 1971 issue of WEED SCIENCE. I will follow this procedure unless you advise me to do otherwise.

Again, thanks for your forwarding this copy of the manual to me.

Sincerely yours,

E. G. Rodgers
Editor and Vice President

EDR:lor



UNIVERSIDADE DE SAO PAULO
ESCOLA SUPERIOR DE AGRICULTURA "LUIZ DE QUEIROZ"
TELEFONES 504 - DIRETOR - 505 - SEC. ADMINISTRACAO
FAX - 507 - 508 E 509 - CAIXA POSTAL 4
END. TELEGRAFICO «ESALQ»
PIRACICABA - ESTADO DE SAO PAULO

QB/319/71.

Piracicaba, June 2, 1971

Information Services, Desk 2
International Plant Protection Center
Oregon State University
Corvallis, Oregon 97331
U.S.A.



Dear Sirs:

I have in hands a copy of the Hopworth & Fine's Herbicide use and Nomenclature Index (HUNI) which was given to me by professor Noxon, of Ohio State University.

I liked very much this useful annual which comes to fill a gap in the subsidiary bibliography for the weed scientists.

Here, at the Escola Superior de Agricultura "Luiz de Queiroz", we began to teach Chemical Weed Control as a curricular discipline for graduation in Agronomy, in 1968. This discipline is developing a great deal of interest in the students and professionals. So, I designed a text book - Texto Básico de Controle Químico de Plantas Daninhas (Basic Text of Chemical Weed Control) which contains the matter taught in the discipline.

Now I am preparing the 3rd editions of the text book, and I intend to improve some chapters, for to make the issue on next August. As soon as the issue is available, I send you a copy.

I would like to receive your publications on weed Science. So, I request that my name be added to the concerned mailing list.

Sincerely yours,

Prof. Dr. Paulo Nogueira de Camargo
Professor of Chemical Weed Control
ESALQ - USP. 13400 Piracicaba, S.P.
Brazil.



DU PONT DE COLOMBIA S.A.
CORREO GUADALUPE CALLE 27 No. 141 PHO. 6.
APARTADO AEREO 1834
BOGOTA - COLOMBIA
CABLES DUCOLSA BOGOTA
TEL. 5040 DUCOLSA 500
CONSTRUCIONES S.A. S. R. L.

cc: J. Cárdenas

Bogotá, D.C., August 6, 1971

L. F. Taylor
International Plant Protection Center
OREGON STATE UNIVERSITY
Corvallis, Oregon, 97331
U. S. A.

Dear Lyall:

I have just received the HUNI book and I wish to thank you for it. I sincerely hope that the IPPC Program can be continued and extended to more countries. The benefit derived from it is invaluable for this country although it is hard to judge in a short term period. But be sure that these benefits will be long lasting. As I have said before, you can count with my full cooperation in any way you want.

I take advantage of this letter to advise that COMALFI is already in possession of the typewriter that the IPPC donated to it. Thank you.

Please give my best regards to everybody and hope to see you back in Colombia some time.

Best regards,

JORGE MENCKEL

JM/mcb



The EAST-WEST CENTER Honolulu, Hawaii 96822

EAST-WEST FOOD INSTITUTE

September 7, 1971

Dr. Lyall F. Taylor
International Plant
Protection Center
Oregon State University
Corvallis, Oregon 97331

Dear Lyall:

I'm grateful for your offer to send the "Weed Research Methods Manual" to some of the places that are hurting for it. I've just been in a meeting for a week with several of these men and I can assure you that some of them will really be helped by using a copy of it. These are the names:

Mr. Kikuo Apis
P.O. Box 371
Ponape
Eastern Caroline Islands
Trust Territory of the Pacific Islands 96941

Mr. Roger Chiment
Agriculture Service
New Caledonia Dependencies
La Foa, New Caledonia

Mr. Michel Lambert
Agricultural Officer
South Pacific Commission
P.O. Box 9
Noumea, New Caledonia

Mr. William Meredith
Department of Agriculture
Government of Western Samoa
Apia, Western Samoa

Dr. P. G. Balayannis
Ecole Supérieure Agronomique D' Athènes
Laboratoire de Chimie Agricole
Botanikos
Athens (301)
GREECE

Mr. M. E. Beshir
Agricultural Research Corporation
Botany & P. Pathology Section
Gezira Research Station
Wad Medani
Sudan, Africa

Mr. E. V. Doku
Department of Crop Science
Faculty of Agriculture
University of Ghana
Accra, Ghana

Mr. Wan-Lai Chang
Chai Yi Agricultural Experiment Station
Chai Yi, Taiwan

Dr. Upali Ekanayake
Plant Physiologist
Coconut Research Institute
Lunusila, Ceylon

Mr. Ir. V. Hardjito
Balai Penelitian Perkebunan
P.O. Box 104
Medan, Indonesia

Dr. Ali Khaled, Chief
Plant Production Section
Ministry of Agriculture and Agrarian Reform
Tripoli, Libya

Mr. Leo Migvar
Assistant Chief of Agriculture
Saipan, Mariana Islands
Trust Territory of the Pacific Islands 96950

Mr. Robert Millaud
Chief, Service De L'Economie Rurale
Papeete, Tahiti

Mr. Tomasi Simiki
Deputy Director of Agriculture
Kingdom of Tonga
Nuku'alofa, Tonga

Mr. Mouafaq Zawawi
c/o Mouafaq, Abbas, Zawawi
Mecca al Nozha
Saudi Arabia

Mr. Jose Barcinas, Director
Department of Agriculture
Agana, Guam

Mr. M. H. Tafatu
Agricultural Officer (Crops)
c/o Agriculture Department
Niue Island

Mr. Pemerika Taullili
Director, Department of Agriculture
Pago Pago
American Samoa

Mr. Navind P. Patel
Research Officer
Rice Agronomy
c/o Koronivia Research Station
Nausori, Fiji

Mr. F. Sousa de Azevedo
Instituto de Investigacao Agronomica de Mocambique
Lourenco Marques
Mozambique, Africa

Mr. Ali Mazahery
Veramine Research Laboratory
P.O. Box 3
Varamin, Iran

Dr. M. K. Moolani
Head, Department of Agronomy
Punjab Agricultural University
Hissar, India

Mr. Rui Fernando Romero Monteiro, Director
Department de Biologia Agricola
Instituto de Investigacao Agronomica de Angola
Caixa Postal 406
Nova Lisboa
Angola, Africa

Dr. Ir. Moeljono Partosoedarmo
Director
Research Institute for Estate Crops
P.O. Box 5
Bogor, Indonesia

Mr. Umporn Suwunnamek
Department of Plant Science
Kasetsart University
Bangkok, Thailand

Dr. M. K. Zahran
Weed Research Section
Department of Agriculture
Orman-Giza
Cairo, Egypt

Thanks,

Whitney
LeRoy Holm
Senior Fellow

Weed Control Research Publications/List of Titles Available from Various Organizations

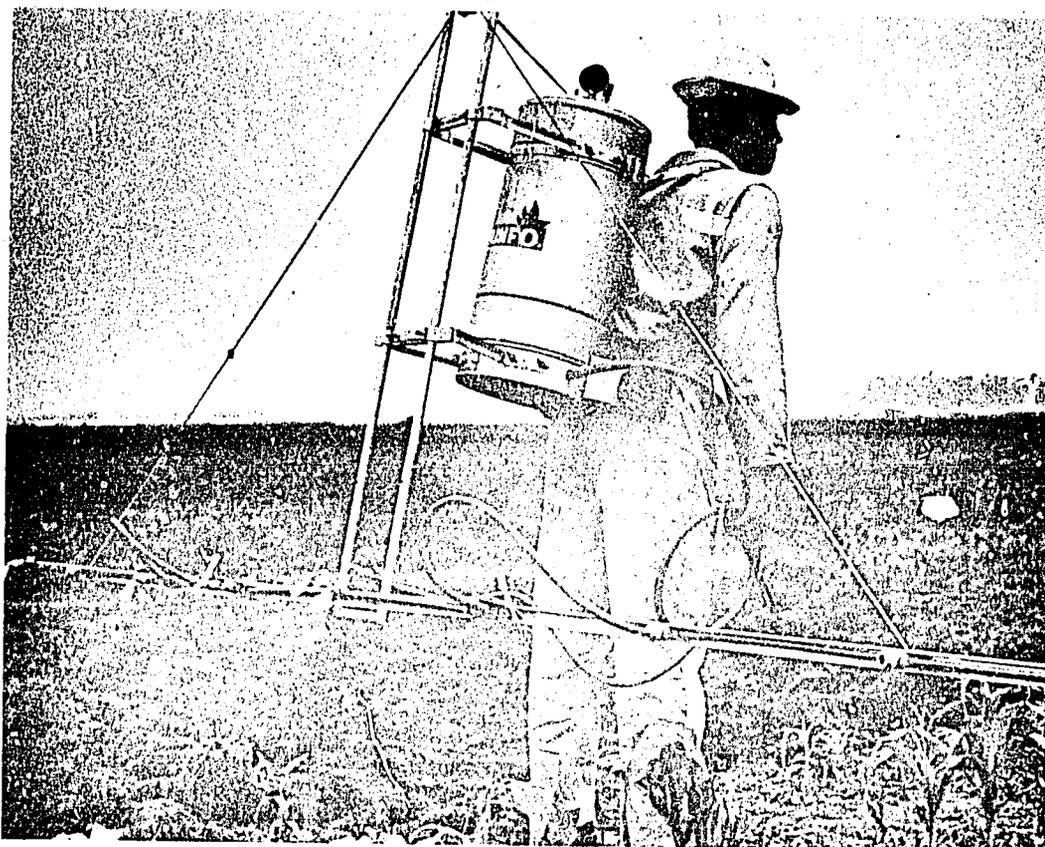
Title	Ident. no.	Language	Pages	Size in inches	Cost	Available from	Notes
✓ Control de Malezas en Maíz Control of Weeds in Corn	003	Spanish	4	8½ x 11	---	ICA	ICA: Instituto Colombiano Agropocuario Apartado Aéreo 7984 Bogotá, D.E., Colombia
Control de Malezas en Sorgo ✓ Control of Weeds in Sorghum	004	Spanish	4	8½ x 11	---	ICA	
Control de Malezas en Banana Establecido ✓ Control of Weeds in Banana Groves	005	Spanish	2	8½ x 10	---	ICA	
✓ El Kikuyo y su Control Kikuyo Grass and its Control	008	Spanish	4	8½ x 10	---	ICA	
Control de Malezas en Ajonjolí ✓ Control of Weeds in Sesame	007	Spanish	2	8½ x 10	---	ICA	
Control de Malezas en Maní ✓ Control of Weeds in Peanuts	008	Spanish	4	8½ x 10	---	ICA	
Control de Malezas en Algodón ✓ Control of Weeds in Cotton	009	Spanish	4	8½ x 10	---	ICA	
Control de Malezas en Soya y Frijol ✓ Control of Weeds in Soybeans and Beans	010	Spanish	4	8½ x 10	---	ICA	
✓ El Cadillo Falso—Una Maloza Nueva False Cocklebur—A New Weed	012	Spanish	2	8½ x 10	---	ICA	
✓ El Buchón y su Control Water Hyacinth and its Control	024	Spanish	2	8½ x 10	---	ICA	
Control de Avena Negra en Trigo y Cobada ✓ Control of Wild Oats in Wheat and Barley	027	Spanish	4	8½ x 10	---	ICA	
La Caminadora y su Control ✓ Raoul Grass and its Control	036	Spanish	4	8½ x 10	---	ICA	
Control de Malezas en Arroz de Riego ✓ Control of Weeds in Irrigated Rice	038	Spanish	4	8½ x 10	---	ICA	
Control de la Salvia y el Salvión ✓ Control of Eupatorium and Ironweed	039	Spanish	2	8½ x 10	---	ICA	
Calibración de Aspersoras Terrestres ✓ Calibration of Sprayers	BT6	Spanish	16	7 x 7¾	---	ICA	
Problemas de Malezas en Sistemas de Riego Weed Problems in Irrigation Systems	20	Spanish	32	6½ x 9¾	---	INCORA	INCORA: Instituto Colombiano de la Reforma Agraria Bogotá, D.E., Colombia
✓ Control del Coyolillo Control of Nutsedge	90	Spanish	4		---	DGIEA	DGIEA: Dirección General de Investigación y Extensión Agropocuaría Santa Tecla, El Salvador
✓ Catálogo de Malezas del Tolima Sur Catalog of Weeds of the Southern Tolima Valley (Colombia)	P1	Spanish	66	8½ x 10	---	ICA	
Clasificación de Herbicidas Classification of Herbicides	38-69	Spanish	34	8½ x 10	---	ICA	
✓ Toxicidad Relativa de Herbicidas Relative Toxicity of Herbicides	---	Spanish	1	8½ x 10	---	ICA	
✓ Precauciones para el Uso de Herbicidas Precautions on Using Herbicides	001	Spanish	4	8½ x 10	---	ICA	
✓ Weeds of Colombia	67-2	English	11	8½ x 11	---	IPPC	IPPC: International Plant Protection Center Oregon State University Corvallis, Oregon 97331/USA
✓ Weeds of Mexico	67-3	English	6	8½ x 11	---	IPPC	
✓ Weeds of Central America	67-4	English	22	8½ x 11	---	IPPC	
✓ Weeds of Trinidad	67-5	English	6	8½ x 11	---	IPPC	
✓ Weeds of Dominican Republic	67-6	English	3	8½ x 11	---	IPPC	
✓ Weeds of Peru	67-7	English	8	8½ x 11	---	IPPC	
✓ Weeds of Venezuela	67-8	English	8	8½ x 11	---	IPPC	
✓ Weeds of Uruguay	67-9	English	8	8½ x 11	---	IPPC	
✓ Weeds of Puerto Rico	67-10	English	13	8½ x 11	---	IPPC	
✓ Weeds of Chile	67-11	English	15	8½ x 11	---	IPPC	
✓ Weeds of Argentina	67-12	English	17	8½ x 11	---	IPPC	
✓ Weeds of Brasil	67-13	English	15	8½ x 11	---	IPPC	
✓ Weed Problems of Turkey	70-2	English	22	8½ x 11	\$1.00	IPPC	Herbicide regulations in Turkey, weeds of economic importance found in crops, maps.
Experimental Herbicides—Status Report by Crop—1971	71-5	English	64	8½ x 11		IPPC	*First copy free; additional, \$2.50 per copy.
✓ Weeds of the Cool Climate	---	Spanish	127	5 x 8	\$3.50	IPPC	Descriptions and full-color plates of 50 economically important weeds found in the Colombian cool climate.
✓ Herbicide Use and Nomenclature Index ("Huni") 632.954.4529a	71-4	English	185	8½ x 11	\$3.00	IPPC	Tables of herbicide common and trade names plus a table of herbicide usage for 68 major food and fiber crops, plus names and addresses for the world herbicide industry.
✓ Weed Research Methods Manual—with emphasis on establishing new programs	---	English	80	5½ x 8½	\$3.00	IPPC	A practical, illustrated handbook of techniques and methods with tables of conversions, application rates, bibliography, and other useful information.

Under Preparation

- ✓ Tropical Weeds/Malezas Tropicales Full-color plates plus detailed descriptions in Spanish and English for 150 economically-important tropical weeds.
- ✓ Manual of Pesticide Application Equipment An illustrated guide covering 30 categories of equipment and safety gear, with emphasis on research and small-plot agriculture, including lists of world manufacturers.
- ✓ Aquatic Weeds Full-color plates plus detailed description in Spanish and English

Acknowledgments

The USAID/OSU weed control project annual report was edited, designed, and published by the International Plant Protection Center, associated with the Department of Agronomic Crop Science, Oregon State University (OSU), Dr. J. Ritchie Cowan, Head of Department, and the Agricultural Experiment Station, Dr. G. Burton Wood, Director. Manuscript typed by Mrs. C. A. Stearns and Mrs. B. E. Bonham. Publication coordination through the Department of Publications; Mr. Thomas France, with proofreading by Mr. John Gill. Photograph production by Photo Services, Mr. William Reasons, Supervisor. Printing and binding by the Department of Printing, Mr. C. E. Peckham, Director. Guidance by USAID Project Monitors Mr. George D. Peterson, Jr., and Mr. Lawrence Kapp.



cover photos

above **A tail boom attached to a pressurized back-pack sprayer is demonstrated at a field day in Colombia.**

front **An ICA technician surveys the results of a corn/weed competition trial at a Colombian research station.**

Lupe Garcia (with microphone) addresses a group attending a field day at Santa Tecla, El Salvador.

back **Weeds, if left uncontrolled, can cause severe yield losses in crops. Larry Burrill clenches barnyard grass (*Echinochloa crusgalli*), one of the world's ten worst weed "enemies."**

