

9310206006201

9310206(4)
PD-AAL-683-A1

DRAFT:SHKrashevski:jeb:4/5/72

Control of Weeds in Less Developed Countries
Oregon State University

B
9p

Importance of Research Problem

Serious crop losses sustained in many developing countries are properly attributed to the numerous varieties of weeds growing in the cultivated lands where they successfully compete with the ^{agronomic} ~~planted~~ crop for fertilizer, water, light and growing space. Conservative estimates of losses in crop yields due to weeds are reported to be around 20% in some LDCs but in tropical areas weeds represent even more serious problems than that. On the extreme, weeds have been known to reduce the yields of crops by as much as 80%.

It is thus safe to assume that weed control will add 20% more crop yields which would be adequate to meet the demands for crop for quite a few years to come.

In the last two decades only the developed countries introduced scientific, systematic weed control and enjoyed the benefits of increased yields; the problem of weeds has not been solved in LDCs. Here the herbicidal chemicals were the key part of the weed control.

In recognition of this problem AID set up a project with Oregon State University.

Significance of Research Findings

There is litany of accomplishments of this project which, to date, was in existence for 5 years at Oregon and it has four years of experience in several Latin American countries. The project operates in collaboration with existing LDC institutions such as ICA (Instituto Colombiano Agropecuario) in

Colombia; INIAP (Instituto Nacional de Investigaciones Agropecuarias) in Ecuador, and DGIEA (Dirreccion General de Investigacion y Extension Agropecuarias) in El Salvador. Also, close coordination is maintained with all concerned USAID Missions.

The backup research at Oregon State University emphasized a program of new herbicide testing : as its use and dosages for over 30 crops. This has been an annual procedure, and results of these were evaluated and published for wide use.

In addition to the herbicide screening program, a number of weed and brush control projects are carried out in Hawaii (under subcontract from Oregon) that provide much needed back-up research information.

Two years ago the program in Hawaii was expanded to include research on rice, taro, tropical corn and sorghum, and pasture weed control. Much of the research done in Hawaii has been directly applicable to the program in Latin America. For example, ratoon sorghum production has just started commercially in Hawaii. (Listed below are research programs on weed control problems well underway:

1. Annual screening of new herbicides.
2. Testing of the herbicide "amiben" under tropical conditions, resulting in widespread testing by the company of amiben on rices; resulting publication in 10th British Weed Control Conference.
3. Research on use of urea fertilizer as carrier for 2,4-D for weed control in rice; resulting publication in Proceedings of 3rd Asian-Pacific Weed Control Conference.

4. Advanced research based on early screening results with 3 new herbicides for direct-seeded rice; resulting publication in Proceedings of 3rd Asian-Pacific Weed Control Conference.
5. Control of woody plants in Hawaiian pastures and range land; resulting publication in above proceedings.
6. Seed pelleting as an approach to herbicide selectivity in direct-seeded rice.
7. Research to index commercial herbicides for tropical and temperate pasture legumes and grasses.
8. Tropical sorghum and corn weed control problems, including weed control in ratoon sorghum production.
9. Weed control in taro grown under both paddy and upland conditions.

The research in IDCs involves several countries; Columbia, Ecuador, Guatemala, El Salvador, Honduran, Costa Rica, Nicaragua and Panama. In all cases, the scientists and their local counterparts operate through existing local institutions.

It deserves to be noted that over 1056 experiments were conducted on about 20 crops and that the results were evaluated and interpreted for local use at various levels of responsibility. These aspects are discussed more thoroughly on the following pages.

In summary the result showed an average loss due to weeds to be above 35% of yields in seven major crops grown in Latin America.

Actual and Potential Utilization

alone
Research above is not enough to attain the desired results of improving agricultural production. Research information must be applied if benefits are to be obtained.

Therefore this project puts a strong emphasis on the assistance to see that the weed control research is applied and properly utilized. This has been carried out by the individual country extension agencies

[In total, 51 publications in English and 35 in Spanish were prepared and distributed to researchers and other interested persons.] Some of these are discussed below. [The herbicide investigation program at Oregon and Hawaii provided information on suitability use methods for over 30 crops.] Each year a report is prepared in which promising new herbicides are listed for the most important crops. The researcher can then select those compounds which appear most promising for his particular crop and type of weed problem. [Over 300 copies of the 1971 "Experimental Herbicide Status Report" were sent to research workers in 35 different countries.] Without a guide such as this, very few research workers in IDC's would be able to select and test only the most worthwhile chemicals.

One of the major handicaps to use of modern weed control methods in developing countries was the almost complete lack of readily available reference books on herbicides, application equipment, techniques of research and so on. [This is being alleviated by the contractor through publication of manuals and a period newsletter (Infoletter).] [Three of the more significant manuals

are listed below:

"Herbicide Use and Nomenclature Index", with tables of common and trade names for herbicides, plus a guide to herbicide usage for 68 major food and fiber crops. This was published early in 1971 and over 1700 copies have been sent throughout the world.

"Weed Research Methods Manual", a practical handbook with emphasis on establishing new weed control research programs, but of use to all weed researchers and their students. This was published in mid-1971 and is now being widely distributed. About 1500 copies have been distributed. A Spanish-language translation is now being prepared.

Manual on Equipment Available Worldwide for proper application of herbicides and other pesticides on small farms or in research trials. This manual has just been completed and should be ready for release by early 1972. It will include 30 different categories of application equipment and one on safety equipment. Equipment from 220 different firms world-wide will be listed. We receive many requests relative to equipment from LDC's and are confident that this book will fill an important need -- for improving their technology and safe use of pesticides.

Weed Identification - Modern weed control practices cannot be effective without a knowledge of the weed species involved. [In most LDC's, many of the weeds, even on government experiment stations, have not been identified or described.] To fill this need, a weed identification book on cool climate weeds was prepared and published (in Spanish) for the Colombian area in 1970. A similar, but more extensive book on tropical weeds is now being printed,

in both English and Spanish.] Recognizing the utility of this book, the chemical companies, local governments, the Rockefeller Foundation and RTAC, have together contributed \$21,000 toward its publication.

These volunteer funds will be sufficient to also cover cost of publishing an identification manual for aquatic weeds of Colombia, which was recently prepared.

Weed identification manuals for eleven other countries have also been published and distributed.

[The field staff of this project assisted in preparation of Weed Control Recommendation Bulletins; such information has been published in Colombia by ICA for: maize, sorghum, banana, sesame, peanuts, soybeans and beans, wheat and barley (control of wild oats), irrigated rice, and on specific control of kikuyu grass, false cocklebur, water hyacinth, raoul grass, and ironweed. Besides a concise text (in Spanish), these sheets feature: tables of amounts of various herbicides to apply for differing soil conditions; list of weed resistance/susceptibility; and, recommendations on time of application.

The information is used widely by the weed control specialists, extension advisors and some farmers.]

The numerous publications have supplied the host countries with an information of their important weeds, in most cases this did not exist before. An exceptionally fine job has been done in disseminating the information.

[A computerized data storage and retrieval system has been set up to answer queries on weed control from AID Country Missions, agricultural experiment stations and others throughout the world. The plan is to supply

answers on any combination of crops, weather, soil or economic factor in association with various alternative methods for optimal controlling or eliminating weeds.

An information letter is issued periodically and distributed to over 2500 people. The "INFOLETTER" is sent free to researchers and other interested personnel in over 100 countries. The contents, for the most part, carry brief summaries of weed control research related activities -- publications, equipment, etc. -- and provide a name and address so that interested personnel may contact the source to secure additional detailed information. It also specifies weed control manuals, etc. that are available on request from the Oregon project. It is widely read in LDC's and many information requests have been, and continue to be, received from those countries.]

Impact

Recognizing that research alone cannot implement the desired results of weed control, the research staff of this project provided technical assistance in application and utilization of research by the local agencies.

[To increase the impact or utilization of research results, the researchers working in Latin America trained 29 counterparts in research and utilization techniques, helped to establish and to operate 12 research stations and were advising 28 graduate students on research problems related to weeds and their control. Eight extension weed control specialists were also trained.]

In training of counterparts as also during fielddays, the emphasis was placed on:

1. know which weeds are present;
2. know the correct type and rate of herbicides to apply;

3. know where to apply;
4. know whether or not to incorporate (This is possible because weeds are ever present and farmers can learn to anticipate them and what to do about their control.);
5. teach how to convert research findings into practical use to create a more effective extension service.

Training of local personnel in weed control research represents an important contribution to the future of these activities in LDCs involved with this project.

Weed Control Societies - As in the United States and Europe, there is a need in the LDC's for organizations to coordinate weed control research and extension activities, as well as the efforts of government, University and industry researchers.

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

The fieldstaff of this project organized a series of weed control field days at various research stations throughout Colombia. Over one thousand people including farmers, extension workers and local researchers attended the field days held in 1970.

During the field days various techniques of weed control were shown and the results discussed critically to point out the best most economical control methods.

The project staff members have assisted in the organization, and participated in the presentation, of weed control short courses in most of the eight countries where the project has been active. Similar short courses were also conducted in Brazil, Paraguay, Bolivia, and Peru early in 1971 at the request of USAID/Washington. Subject matter covered background basics and stressed safety in the correct use of herbicides and application equipment. Host-country counterparts have been actively involved in all phases of these sessions. The courses are well accepted and attended by local experiment station researchers, University personnel, technical advisors, Peace Corps Volunteers, and leading farmers.

It is important to note that the impact will be magnified by the people trained during this contract. Surprisingly large numbers of these individuals remain in the field which is rather unusual for developing countries.

Another important form of activity connected with this project is the International Plant Protection Center, which was recently established at Oregon State. It is a multidisciplinary entity designed to assist developing countries in increased agricultural efficiency through improved control of weeds, insects, plant diseases, rodents, and other elements of the natural environment which may hamper crop production, cause food spoilage, or result in storage losses. It provides research, education, extension consultation, and information exchange.

In summary it can be stated that:

Oregon State University research on weed problems in developing countries has made it possible to design weed control programs tailored to the specific needs of a number of countries in Latin America.

The project has been reviewed intensively by A.I.D. and outside scholars with the results that some modifications and direction of emphasis have been recommended which were incorporated in the project statement to be reviewed by RIGC and RAC at their forthcoming meeting.

In a nutshell, the new goals proposed by the review committee are:

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

The new objectives will allow the contractor to broaden the approach of weed control to align it with the view of it being an important tool in social and economic development. The new research approach will also include considerations of the consequences of alternative approaches to the weed problem.