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ENVIRONMENTAL ASSESSMENT

Environmental Assessment for the Agronomic Technical Assistance Component of the Democratic Labor Development Project (AID Project Number 519-0368)

Prepared for: U.S. Agency for International Development,
San Salvador, El Salvador
Under a Subagreement with the
American Institute for Free Labor Development

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ENVIRONMENTAL ASSESSMENT FOR THE AGRONOMIC TECHNICAL ASSISTANCE COMPONENT OF THE DEMOCRATIC LABOR DEVELOPMENT PROJECT

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[1] Letters in parentheses () indicate which of the twelve factors listed in 22CFR216, 216.3 (b)(1) is being addressed

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LIST OF ACRONYMS AND ABBREVIATIONS

ACOPAI	Asociación Cooperativa de Produccion Agropecuaria Integrada
AID	Agency for International Development
AID/ES	Agency for International Development in El Salvador
AID/LAC	AID Bureau for Latin America and the Caribbean
AID/LAC/DR/ EST	AID Bureau for Latin America and the Caribbean/ Office of Development Resources/ Education, Science, and Technology Division
AID/W	Agency for International Development in Washington, DC
AIFLD	American Institute for Free Labor Development
AIFLD/DLDP-ATAC	American Institute for Free Labor Development/ Democratic Labor Development Project- Agronomic Technical Assistance Component
APA	Asociación de Proveedores Agrícolas
ATAC	Agronomic Technical Assistance Component of DLDP of AIFLD
BC	Banco Central (Central Bank)
BFA	Banco Fomento Agropecuario (Agricultural Development Bank)
BID	Banco Interamericano de Desarollo (Interamerican Development Bank)
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CB	Central Bank (Blanco Central)
CENDEPESCA	Centro de Desarrollo Pesquero
CENREN	Centro de Recursos Naturales (Natural Resources Center)
CENTA	Centro Nacional de Tecnología Agropecuaria (MAG)
CFR	Code of Federal Regulations
CICP	Consortium for International Crop Protection
CLUSA	Cooperatives Leagua of USA (Liga de Cooperativos de los Estados Unidos)
CTD	Confederacion de Trabajadores Democraticos (Democratic Workers Central)
DDA	Dirección de Defensa Agropecuaria (Plant and Animal Protection)
DIVAGRO	Democratic Labor Development Project
EA	Environmental Assessment
EAP	Escuela Agrícola Panamericana, Panamerican Agriculture School at El Zamorano, Honduras
ENA	Escuela Nacional Agrícola (National Agricultural School)
EPA	Environmental Protection Agency of USA
ES	El Salvador
ES/MOH	El Salvador's Ministry of Health

LIST OF ACRONYMS AND ABBREVIATIONS (Cont'd.)

FDA	Food and Drug Administration of the US
FECORASAL	Federacion Cooperativa de la Reforma Agraria Salvadorena (Regional Phase I Cooperative Federation)
FOES	Fundacion Obrero Empresarial Salvadoreno (Salvadorian Foundation - SF)
FUSADES	Fundación Salvadoreña para el Desarrollo Económico y Social
FUSADES/ DIVAGRO	Fundación Salvadoreña para el Desarrollo Económico y Social/Democratic Labor Development Project
GIFAP	Groupement Internacional Produits Agrochimiques des Associations Nationales de Fabricants de Produits Agrochimiques
GOES	Government of El Salvador
GTZ	Gesellschaft für Technische Züsammenarbeit
IEE	Initial Environmental Evaluation
IPM	Integrated Pest Management (Manejo Integrado de Plagas)
LAC/AG	Latin America and the Caribbean/Agriculture
LD_{50}	Lethal dose, expressed in milligrams of pesticide per kilogram of body weight, required to kill 50% of the test population
LOP	Life of Project
MIP	Manejo Integrado de Plagas (Integrated Pest Management)
MAG	Ministerio de Agricultura y Ganaderia (Ministry of Agriculture)
MAG/DDA	Ministerio de Agricultura y Ganaderia (Ministry of Agriculture)/Dirección de Defensa Agropecuaria (Plant and Animal Protection)
MOH	Ministerio de Salud (Ministry of Health)
OIRSA	Organismo Internacional Regional de Sanidad Agropecuaria
PAHO	Pan American Health Organization
PID	Project Identification Paper
PP	Project Paper
PPM	Parts Per Million
P/PM	Pest/Pesticide Management
QAP	Quality Assurance Program (FUSADES/DIVAGRO Programa de Calidad Integral)
RENARM	Regional Natural Resources Management Project (ROCAP/CATIE-EAP)
ROCAP	Regional Office for Central America and Panamá (AID)
RPAR	Rebuttable Presumption Against Registration
RU	Restricted Use Pesticide (USEPA designation for pesticides requiring purchaser and user to be a certified applicator)

LIST OF ACRONYMS AND ABBREVIATIONS (Cont'd.)

SF	Salvadoran Foundation (Fundacion Obrero Empresarial Salvadorena)
UCS	Union Comunal Salvadoreno (Salvadorean Communal Union)
UNOC	Union of Workers and Peasants
US	United States of America
WB	World Bank
WHO/FAO	World Health Organization/Food and Agriculture Organization

EXECUTIVE SUMMARY

A. PROJECT LOCATION:

Project Location	:	El Salvador
Name of AID Project	:	Democratic Labor Development Project
Number of AID Project	:	519-0368
Project Implementor	:	AID/El Salvador
Life of Project	:	3 years (FY 1990-93)
Funding	:	$14.4 million
IEE Prepared by	:	Edward Landau, Environmental Coordinator, AID/ES
PID Approved by	:	Henry Bassford Rur. Dev. Office, AID/ES

B. PROJECT DESCRIPTION AND ENVIRONMENTAL ASSESSMENT:

The Agency for International Development (AID) Democratic Labor Development Project (DLDP) 519-0368 with the American Institute for Free Labor Development (AIFLD) will provide support for actively promoting the process of democratization through the development of a strong and vigorous democratic labor movement in both urban and rural sectors of El Salvador. The goal of the new project is to consolidate and expand the democratic labor movement. The purpose is to improve the services provided to members by the Union of Workers and Peasants (UNOC) and the Democratic Workers Central (CTD), as well as other democratic trade unions. The project has five main components which encompass several sub-activities. The components are: (1) UNOC, (2) Urban Unions, (3) Rural Unions, (4) administrative support to AIFLD and (5) the Salvadoran Foundation (SF or Fundación Obrero Empresarial Salvadoreno - FOES). Sub-activities under these components cover traditional union activities, such as membership drives, organizational strengthening, leadership training, and vocational training. A relatively new sub-activity of this project is agronomic technical assistance to increase farm production through development and implementation of simple technical packages including improved seed varieties, agrichemicals, improved low-cost cultivation practices, conservation of soils, water management, and optimization of machinery use. It is recommended that the project emphasize training of non-chemical control methodology in an integrated pest management (IPM) approach as an alternative to pesticide use, as well as proper transport, storage, and use of pesticides when required. If this strategy is followed, the project is not likely to have a major negative environmental impact because of promotion of non-chemical and sane and safe pesticide use when required; therefore, a negative determination is recommended.

In fact, the project should have a positive effect on the environment by providing alternative pest management technology and sane and safe pesticide management. In the same way, development of linkages with institutions currently conducting IPM research have the potential to further reduce potential environmental impacts from this activity, during the expected future development of the sector. However, care must be taken to promote IPM and its long-term economic advantages rather than the short-term profits of the microagroenterprises. This will require extensive training of project technicians in IPM concepts and field application as well as pesticide management and safety.

To assure compliance with AID pesticide regulations, pesticide training and monitoring programs were outlined in this document. Execution of these programs will be a requirement for the implementation of this component. We recommend that AIFLD/DLDP hire or reassign a technician to oversee the pest/pesticide management training, implementation, and monitoring programs. These programs must include the following:

1. Execute the pest/pesticide management training guidelines for project technicians and farmers as discussed in Section IV.1.5 and Annexes 1 and 2.

2. Execute the guidelines for the design and establishment of agrichemical microenterprises including standards for transport, storage, and safety as discussed in Sections IV.1.2., IV.1.5, and Annex 3.

3. Execute the guidelines for a monitoring program that will ensure agrichemical microenterprise and farmer compliance with GOES and U.S.A.I.D regulations as discussed in Sections III.2.6, IV.1.6, IV.1.7, and Annex 4.

The project is designed to concentrate activities in areas already under agricultural production. However, if pesticides are used near national preserves, set-aside lands, ecologically sensitive areas, or areas designated as critical habitat for endangered species, the AID Project Manager should make sure the project complies with requirements of Section 119 of the Foreign Assistance Act.

Also, we recommend that AID/ES request AID/Washington (AID/W) to authorize the following:

1. Project agrichemical microenterprises be allowed to purchase and sell, and participating cooperative producers be allowed to use, selected restricted use pesticides in emergency situations on project crops where extensive crop loss will otherwise occur. This use will be limited to cases where the application will be under the direct supervision of

highly trained (U.S. Commercial Certified Applicator Equivalent) project personnel or participating farmers. This is required to assure the success of the project and the competitiveness of participating producers (see Sections III.2.2, 2.3, and 2.4). It is envisioned that at least one farmer per cooperative per year will be trained. Initial training would concentrate on Presidents and Jefes de Campo (Field Supervisors) that supervise or have the greatest influence on pesticide use by the cooperatives.

This training could be accomplished initially by utilizing the pesticide applicator certification program of Fundación Salvadoreña para el Desarollo Económico y Social (FUSADES) Diversificación Agricola (DIVAGRO). However this should be contingent upon the mobilization of the Ministry of Agriculture's Department of Plant and Animal Protection (MAG/DDA) to enforce the applicator certification laws that have been previously enacted in El Salvador (Section III.2.5 and Appendix 7). The proposed new pesticide law includes pesticide applicator certification requirements and MAG/DDA has recently certified the DIVAGRO applicator certification training program. They expressed a willingness to continue to cooperate with DIVAGRO in giving the course to ATAC personnel and subsequently cooperating with ATAC personnel in giving the course to project farmers. MAG/DDA has also indicated a willingness to work with ATAC personnel to develop an emergency declaration program which would involve their participation in the emergency declarations requiring RU pesticide use.

2. Approval should be sought from AID/W for the use of any products not listed in Table 1 on those crops; i.e. coffee, plantain (plátano), sesame, and yucca, which are not grown extensively in the U.S. and which have limited pesticide registrations. The requests should be based on established WHO/FAO residue tolerances for the pesticides being requested.

In order to extend the impact of the proposed activities we urge that the following suggestions be implemented by AID/ES and AIFLD/DLDP to the extent possible with project or other resources.

SUGGESTIONS

I. Activities directly related to project implementation:

A. Suggestions related to those proposed by Vega and Ward (1989):

1. To assure the availability of alternative IPM strategies and an effective pesticide arsenal, it is suggested that linkages be developed with institutions (FUSADES/DIVAGRO, Esquela Agrícola Panamerican (EAP), Centro Agronómico Tropical de Investrigación y Enseñanza (CATIE), etc.) that have IPM research components. This will assure the use of the latest IPM technology as it becomes available.

2. To assure availability of up-to-date pesticide information and "shelf" IPM technology, AIFLD should help FUSADES develop the computer-supported technical information center FUSADES has initiated to support an effective outreach program.

II. Activities not directly related to project implementation, but should be considered by AID/ES in implementing the Mission Natural Resources Strategy:

A. Suggestions related to those proposed by Vega and Ward (1989):

1. Implement the previous suggestion (Vega and Ward 1989) to provide equipment to Centro de Deserollo Pesquero (CENDEPESCA) in order for them to monitor the biological diversity actually present at Los Cóbanos coral reef and the possible effects from pesticides and mariculture on this ecosystem. This takes on added importance with the proposed expansion of agriculture in the littoral area. If not already implemented, this equipment should be provided in time to allow baseline samples to be taken prior to pesticide sale by the project.

2. Increased agricultural activities being promoted by this project will place added pressure on some of the mangrove areas. Therefore, the suggestion by Vega and Ward (1989) for the establishment of a protective belt between crop land and the mangrove vegetation to reduce the amount of pesticides entering the estuarine ecosystems takes on added significance. The promotion of planting fast growing tree species to provide for

firewood would still be a good way to accomplish reduced contamination and reduce cutting pressure on mangrove swamps as well.

B. Suggestions related to those proposed by Higgins et al. (1988) as required in the Scope of Work, see Appendices 1 and 3:

1. Conduct research to determine the efficacy of less toxic, general use chemicals such as those being suggested for use on this project (Table 2). Adaptive research will be required to test chemical alternatives and to refine this list. Farmers are familiar with the use of certain chemicals (mostly restricted use) and will continue to use them unless additional information is made available and alternatives are offered. Alternatives must be equally priced or they will be undersold by the more toxic chemicals (Sections III.2.2, 2.3, and 2.4).

   FUSADES/DIVAGRO is conducting such trials for non-traditional export crops. CENTA should be encouraged by AID/ES to do similar research on the basic grains and other project crops as part of their IPM (MIP) projects.

2. The current exchange rate does not overly encourage the importation of agricultural inputs, including pesticides. However, the Central Bank (CB) still treats the importers of agrichemicals preferentially. AID/ES still should consider working with DDA, CB, and Economía Agropequaria to encourage the cancellation or restriction of the importation and/or sale of the more highly toxic chemicals. Higgins et al. (1988) further suggested an alternative of a quota system or tax levied on the more toxic chemicals to discourage their importation and use. Import or registration fees could then be used to directly support safety and monitoring programs and IPM research and development.

   There are a number of arguments that could be used against this approach. One of the most important is that it would just increase the amount of contriband chemical moving into El Salvador unless the same approach is used in all Central American Countries and Mexico during the same period. Another is that a high percentage of the pesticide used is on the basic grains and any increased costs will affect needed food production.

3. Salvadoran banks traditionally have offered bland loans for the purchase of pesticides, but not for alternative pest control measures. This practice amounted to a subsidy for pesticide inputs. AID/ES is currently working with the Agricultural Bank (BFA) to phase them out of the business of selling agrichemical inputs which should help reduce their promotion of pesticide use.

   Project farmers will have access to safety equipment through the cooperative microenterprises and DLDP/ATAC technicians will require them to use that equipment. This could be enhanced by requiring bank loan officers to attend pest/pesticide management classes to learn the need for such equipment. AID/ES indicated that the Agrarian Reform Credit Project 519-0307 is being extended for 1-2 more years and such training could be required in that project. Project loan officers should also be required to attend such training.

4. The recommendation that IPM should be an explicit component of all future agricultural development projects, including AID projects in El Salvador, has not been uniformly initiated. The Amendment No. 4 of the Agribusiness Development Project (519-0327) had an IPM component (Vega and Ward 1989), but none of the other projects (including this one) have had an IPM component.

5. The recommendations on training have mostly been addressed in previous items in this section, in previous AID/ES efforts (such as the Water Management Project as suggested by Higgins et al. 1988), and in the current project EA. However, public health official training and information needs still need to be addressed. It is recommended that the health program of AIFLD join the project in providing pertinent information on pesticide poisoning and treatment to health institutions in project areas. They should also be encouraged to register intoxication cases with the Ministry of Health. A program of choline esterase monitoring in the project area is recommended to verify training effectiveness (Annex 4).

CHAPTER ONE:

PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

Conservation of renewable natural resources has proven to be essential for the achievement of sustained development. Sustainability of the benefits obtained from them over time, in the form of goods and services, depends on the healthy preservation of the ecosystems they are coming from. This applies to all forms of resource utilization (agriculture, forestry, aquaculture or fisheries).

However, present natural resource utilization patterns in most developing countries are threatening these resources. The pressures from rapidly expanding population, poverty, concentrations of resources, tenure, and political instability, have usually led to the application of shortsighted economic and resource management policies. This approach might lead to environmental damage and natural resource destruction generating more poverty and actually narrowing the possibilities of future economic growth and development.

1.0. AID POLICY FOR THE ENVIRONMENT AND NATURAL RESOURCES

The above paragraphs show some of the reasons why the United States (US) Congress has become sensitive to environmental impacts abroad. As a consequence of that, Congress has mandated that the Agency for International Development (AID) consider the risks of environmental effects in all project assistance.

AID's major environmental objective is to promote rational resource management for sustainable utilization. To achieve this, the approach must be an environmentally sound one, which looks for conservation of natural resources for the benefit of future, as well as present, generations. This approach has better chances of achieving desirable long-term economic growth.

In accordance with the above, the three major AID environmental program areas are: sustainable production, maintenance of natural ecosystems, and meeting human needs by improving environmental quality. Special concern issues include the conservation of tropical forests and preservation of biological diversity.

The environmental regulations adopted by the Agency (AID/W 1980) apply to all new projects, programs or activities approved as well as substantive amendments or extensions of ongoing ones. Exceptions to the established environmental procedures are related mainly to circumstances of emergency situations or exceptional foreign policy sensitivities.

Certain actions are excluded from the procedures. These include activities that do not have an effect on the natural or physical environment, research activities which might have a limited effect on the environment but are performed under carefully controlled conditions, or when AID does not have knowledge or control of the details of specific activities that might affect the environment. However, all of these exclusions are not applicable when the procurement or use of pesticides is involved in the assistance.

The requirements of the environmental examination and the specifics for conducting an Environmental Assessment (EA) are contained in "Reg. 16" - 22 Code of Federal Regulations (CFR) Part 216. A summary of how to conduct an EA (Bottrell, et al. 1991) is available from the Consortium for International Crop Protection (CICP).

2.0. PROJECT ACTIVITIES

Project 519-0368 with the American Institute for Free Labor Development (AIFLD) will provide support for actively promoting the process of democratization through the development of a strong and vigorous democratic labor movement in both urban and rural sectors of El Salvador. The goal of the Democratic Labor Development Project (DLDP) is to consolidate and expand the democratic labor movement. The purpose is to improve the services provided to members by the Union of Workers and Peasants (UNOC) and the Democratic Workers Central (CTD), as well as other democratic trade unions. The project has five main components which encompass several sub- activities. The components are: (1) UNOC, (2) Urban Unions, (3) Rural Unions, (4) administrative support to AIFLD, and (5) the Salvadoran Foundation (SF - FOES). Sub-activities under these components cover traditional union activities, such as membership drives, organizational strengthening, leadership training, and vocational training. A relatively new subactivity of this project is agronomic technical assistance to increase farm production through development and implementation of simple technical packages including improved seed varieties, agrichemicals, improved low-cost cultivation practices, conservation of soils, water management, and optimization of machinery use. Initially two agricultural micro enterprises will also be developed and will include the procurement and sale of fertilizers, pesticides, and other supplies.

2.1. Agronomic Technical Assistance Component

The agronomic technical assistance component (ATAC) will include the purchase and sale of agrichemicals, including fertilizers and pesticides, through agricultural microenterprises to be developed

with project funds. Simple technical packages also will be developed and implemented through the assistance of project technicians hired by the participating cooperatives.

It is recommended that the project emphasize training in non-chemical control methodology in an integrated pest management (IPM) approach as an alternative to pesticide use, as well as provide traning in the proper transport, storage, and use of pesticides when required. Through such training the project should have a positive effect on the environment by providing alternative pest management technology and sane and safe pesticide management and use practices to a wide segment of Salvadoran agriculture. In the same way, development of linkages with institutions currently conducting IPM research have the potential to further reduce possible environmental impacts from this activity, during the expected future development of the sector. However, care must be taken to promote IPM and it's long-term economic advantages rather than the short-term profits of the microagroenterprises. This will require extensive training of project technicians in IPM concepts and field application as well as pesticide management and safety.

With the suggested association with the Quality Assurance Program (QAP) of the Fundación Salvadoreña para el Desarrollo Económico y Social program of Diversificación Agrícola (FUSADES/DIVAGRO) and other institutions, over a three year period, the DIVAGRO/QAP program can help to provide technical assistance, extension educational activities, and training in pesticide monitoring and product inspection. Initial training of AIFLD personnel will allow the training of a network of field agents. This will allow AIFLD to transfer plant protection technology which incorporates integrated pest management (IPM) techniques, such as pest monitoring, economic thresholds, biological control, and rational pesticide use to cooperative beneficiaries. It is envisioned that at least one farmer per cooperative per year will be trained. Initial training would concentrate on Presidents and Jefes de Campo (Field Supervisors) that supervise pesticide use on the cooperative.

The ATAC also will include testing of pesticide residues through a randomized sampling program of on-farm, in-plant, and pre-shipment products. Since the in-country CENTA laboratory is currently not fully functioning, the establishment of a pesticide residue lab under the QAP, is of major benefit to this project .

ATAC field staff will work closely with DIVAGRO QAP staff in developing pesticide management and safety training for farmers participating in the project's traditional and non-traditional crop production program. This will allow the introduction of some IPM practices (Chapter III.2.4.) in the production guides. Other activities will include monitoring pesticide use, promotion of

less toxic pesticides, and search for non-chemical control techniques.

Current pest control guides in El Salvador (Appendix 6) rely heavily upon the use of pesticides. This may well continue initially with the initiation of the project ATAC component, but will provide the first step toward rational pesticide use in a large segment of El Salvador's agriculture.

3.0. ENVIRONMENTAL ASSESSMENT

The purpose of the Environmental Assessment (EA) of the AIFLD/DLDP-ATAC is to provide AID and host country decision makers with information on possible environmental effects derived from the implementation of the proposed project. In this case we are looking at the potential environmental effects that might come from the activities financed by the project.

A positive determination was made on the project in the Initial Environmental Evaluation (IEE) indicating that some negative environmental effects were expected (Appendix 2). This was due primarily to the fact that the DLDP proposes to support an agronomic technical assistance component based on the purchase of pesticides and the promotion of simple technical packages that include pesticides. The ATAC is expected to increase the production of traditional basic grain, non-traditional export, and rotation crops. With the proposed training and institutional linkages, it is proposed that the objectives can be met while reducing the quantities of pesticide used and increasing the safety of users. As per Section 216.3(b) (i) categorical exclusions, AID's environmental regulations are specifically required for projects that purchase pesticides with AID funds that are not exclusively for experimental use.

The experience thus far under the AID/ES-FUSADES/DIVAGRO Project is that agribusinesses exporting to the US are extremely careful to comply with US pesticide use and application requirements because of the potential closure of export markets. So far vegetable producers in El Salvador have had no problems in this regard. In addition, because the DLDP will involve the use of IPM technology, the project will insure that adverse environmental impacts do not occur or are minimized while fulfilling the original project goal of increasing the production and export of selected non-traditional crops and basic grains for internal consumption.

CHAPTER TWO:

SELECTION OF THE PREFERRED ALTERNATIVE

In this chapter we identify two alternatives which serve as a basis for the EA. The alternatives are described, and an analysis is made of the overall, long-term effects that the implementation of each one would have on the environment.

1.0. DESCRIPTION OF ALTERNATIVES

Since the project is pursuing the implementation of activities which are more likely to have a beneficial impact on the environment under the country's present conditions, the only alternatives considered are (1) the implementation of the activities funded by the project as described in the previous chapter and (2) the no action alternative.

2.0. ASSESSMENT OF ALTERNATIVES

As a logical framework, we developed a set of criteria to determine which one of the considered alternatives should be implemented. Then the set of criteria was applied to each of the two alternatives being considered and the more sound one was selected.

Based on AID's environmental regulations and policy, the set of criteria established were the following:

- Pesticide risk for humans and the environment;
- Protection of tropical forests;
- Protection of biological diversity;
- Socioeconomic development; and
- Development and institutionalization of an IPM approach to pest control

On the application of the above set of criteria, we kept in mind the limited capacity of AIFLD to enforce regulatory or control measures, since it is private sector and not a government institution. However, we consider that this program will be linked with FUSADES/DIVAGRO which is already playing an important role in the strengthening of the capabilities of public institutions. Because of that, we have included a series of

desirable recommendations which would further enhance the beneficial effects of this project on the environment.

2.1.Criterion One: Pesticide Risk for Humans and the Environment

Alternative one provides additional knowledge, extension, and technical assistance for the management and use of pesticides. IPM considerations should help to decrease the total amount of pesticides applied. The testing of pesticide residues by the quality control laboratory in export products is likely also to increase the consciousness of using similar safety parameters for the local products as well. Additionally, part of the production which does not qualify for export, because of regulations other than pesticide residues, will go to local markets providing low-level pesticide residue vegetables and other crops for the local population.

The fact that the project includes the utilization of the DIVAGRO QAP pesticide residue lab to assure safe pesticide use represents a major improvement over most projects. This will allow the ATAC to comply with AID pesticide procurement and use policies in the production of non-traditional crops by producers financed with AID funds. Testing of basic grains and other crops for internal consumption is optional (but desirable), if other controls are instituted in other phases of the monitoring program. The features of the required residue testing program are outlined in chapter four and Annex 4.

Under alternative two, the situation will continue like it is or evolve towards a higher risk, since the expansion of the activities would demand more pesticide use. In addition to this, the continuous cropping of vegetables and other crops is likely to further increase the need for chemical control.

2.2. Criterion Two: Protection of Tropical Forests

The implementation of the project, as proposed, is going to increase general public awareness of the role that a healthy environment, including mangrove forests, play in the maintenance of productive agricultural lands and shrimp ponds. It is likely to cause a renewed interest from the most serious investors of the sector to exert pressure on government agencies to enforce sound regulatory mechanisms.

Under alternative two this situation may also develop, but at a slower pace. The longer the time span, the greater effect destructive activities, such as overuse of pesticides, mangrove cutting, and tidal flow alterations, are going to have on the

agroecosystems, tropical forests, estuaries, mangrove swamps, and marine environments.

2.3. Criterion Three: Protection of Biological Diversity

The situation of biological diversity is similar to the previously described protection of tropical forests.

The increased protection of mangrove forests likely to occur under the implementation of alternative one, is also likely to maintain the habitat diversity required for biological diversity to occur in all areas. The presence of mangrove forests will continue putting biomass subsidy into the estuarine ecosystem, maintaining the food supply required for growth of animal species.

Additionally, the reduced amount of pesticide utilization which is likely to occur with the implementation of DLDP, combined with the promotion of less toxic and less persistent types of pesticide will release some of the pressure exerted by pesticide residues in estuaries. The release of the pressure exerted by any stressor has proved to increase productivity and biological diversity in natural ecosystems.

Under alternative two, we have already discussed that the benefits of the protection of tropical and mangrove forests would at least be delayed if they ever occur. The benefits for biological diversity coming from the maintenance of tropical and mangrove forests, therefore, will also be delayed. On the other hand, the pesticide residue stress on the estuarine ecosystem is likely to increase, reducing the biological diversity to only those species which are able to withstand the levels of contamination which will result from increased use.

2.4. Criterion Four: Socioeconomic Development

Under alternative one, the decreased use of imported pesticides and the development of better control methods through an IPM approach is more likely to improve profitability of agriculture. These better management techniques would decrease costs and increase production which would increase the generation of foreign exchange. With improved economic conditions and increased food supplies, there should be less unemployment and hunger in the country.

In addition, the application of a pesticide residue sampling program will prevent important markets from becoming inaccessible to Salvadoran exports, because of illegal pesticide residues being present in the export products. It will also provide a

means to enforce the application of AID and ES pesticide purchase and use regulations.

None of the benefits for socioeconomic development mentioned in the above paragraphs will be achieved by the no action alternative. The exclusion of Salvadoran products from foreign markets is probably the more dangerous threat to the strategy of promoting economic growth through non-traditional exports. The continuous and perhaps increased indiscriminate use of the generally more toxic restricted use pesticides could result in the continued occurrence of pesticide illnesses and related deaths, and pest resistance to pesticides. These factors will continue to delay socioeconomic development of El Salvador if the no action alternative is accepted.

2.5 Criterion Five: Development and Institutionalization of an IPM Approach to Pest Control

As previously stated in Chapter I Section 1.0, one of AID's major environmental objectives is to promote rational resource management for sustainable utilization. One of the management methodologies to accomplish this is to utilize IPM. Under alternative one, the better utilization of non-chemical control methods through on IPM approach could result in the decreased use of imported pesticide.

In addition, the linkages with on-going IPM research programs in and outside El Salvador will help force the institutionalization of these research programs. The linkages with MAG/DDA in the applicator certification and emergency declaration programs will further stimulate the adoption of IPM practices by that government agency also. The linkage with MAG/CENTA will have a similar effect.

With IPM being included in a private sector project through trade unions and cooperatives, stronger grower acceptance may be expected. This will provide an even greater impetus to institutionalization of IPM.

Under alternative two, IPM will not allow this additional training and practice to occur and would result in a delayed institutionalization of IPM.

3.0. RECOMMENDED ACTIONS TO ADDITIONALLY ENHANCE ENVIRONMENTAL PROTECTION

Alternative one implementing the ATAC of the project is the preferred alternative. The preceding analysis based on four general criteria shows obvious advantages of implementing the component against the alternative of just funding the other

project components and not providing training and assistance on pesticide use.

AID and AIFLD could even enhance the environmental soundness of the project by implementing some of the following recommendations, depending on the circumstances. These recommendations are not all required but they are highly desirable and will enhance the likelihood of the success of the activities to be funded.

In order to extend the impact of the proposed activities, we urge that the following suggestions be implemented to the extent possible with project or other resources.

RECOMMENDATIONS:

To assure compliance with AID pesticide regulations, pesticide training and monitoring programs were outlined in this document. Execution of these programs will be a requirement for the implementation of this component. We recommend that AIFLD/DLDP hire or reassign a technician to oversee the pest/pesticide management training, implementation, and monitoring programs. These programs must include the following:

1. Execute the pest/pesticide management training guidelines for project technicians and farmers as discussed in Section IV.1.5 and Annexes 1 and 2.

2. Execute the guidelines for the design and establishment of agrichemical microenterprises including standards for transport, storage, and safety as discussed in Sections IV.1.2., IV.1.5, and Annex 3.

3. Execute the guidelines for a monitoring program that will ensure agrichemical microenterprise and farmer compliance with GOES and U.S.A.I.D regulations as discussed in Sections III.2.6, IV.1.6, IV.1.7, and Annex 4.

The project is designed to concentrate activities in areas already under agricultural production. However, if pesticides are used near national preserves, set-aside lands, ecologically sensitive areas, or areas designated as critical habitat for endangered species, the AID Project Manager should make sure the project complies with requirements of Section 119 of the Foreign Assistance Act.

Also, we recommend that AID/ES request AID/Washington (AID/W) to authorize the following:

1. Project agrichemical microenterprises be allowed to purchase and sell, and participating cooperative producers be allowed

to use, selected restricted use pesticides in emergency situations on project crops where extensive crop loss will otherwise occur. This use will be limited to cases where the application will be under the direct supervision of highly trained (U.S. Commercial Certified Applicator Equivalent) project personnel or participating farmers. This is required to assure the success of the project and the competitiveness of participating producers (see Sections III.2.2, 2.3, and 2.4). It is envisioned that at least one farmer per cooperative per year will be trained. Initial training would concentrate on Presidents and Jefes de Campo (Field Supervisors) that supervise or have the greatest influence on pesticide use by the cooperatives.

This training could be accomplished initially by utilizing the pesticide applicator certification program of Fundación Salvadoreña para el Desarollo Económico y Social (FUSADES) Diversificación Agricola (DIVAGRO). However this should be contingent upon the mobilization of the Ministry of Agriculture's Department of Plant and Animal Protection (MAG/DDA) to enforce the applicator certification laws that have been previously enacted in El Salvador (Section III.2.5 and Appendix 7). The proposed new pesticide law includes pesticide applicator certification requirements and MAG/DDA has recently certified the DIVAGRO applicator certification training program. They expressed a willingness to continue to cooperate with DIVAGRO in giving the course to ATAC personnel and subsequently cooperating with ATAC personnel in giving the course to project farmers. MAG/DDA has also indicated a willingness to work with ATAC personnel to develop an emergency declaration program which would involve their participation in the emergency declarations requiring RU pesticide use.

2. Approval should be sought from AID/W for the use of any products not listed in Table 1 on those crops; i.e. coffee, plantain (plátano), sesame, and yucca, which are not grown extensively in the U.S. and which have limited pesticide registrations. The requests should be based on established WHO/FAO residue tolerances for the pesticides being requested.

In order to extend the impact of the proposed activities we urge that the following suggestions be implemented by AID/ES and AIFLD/DLDP to the extent possible with project or other resources.

SUGGESTIONS

I. Activities directly related to project implementation:

A. Suggestions related to those proposed by Vega and Ward (1989):

1. To assure the availability of alternative IPM strategies and an effective pesticide arsenal, it is suggested that linkages be developed with institutions (FUSADES/DIVAGRO, Esquela Agrícola Panamerican (EAP), Centro Agronómico Tropical de Investrigación y Enseñanza (CATIE), etc.) that have IPM research components. This will assure the use of the latest IPM technology as it becomes available.

2. To assure availability of up-to-date pesticide information and "shelf" IPM technology, AIFLD should help FUSADES develop the computer-supported technical information center FUSADES has initiated to support an effective outreach program.

II. Activities not directly related to project implementation, but should be considered by AID/ES in implementing the Mission Natural Resources Strategy:

A. Suggestions related to those proposed by Vega and Ward (1989):

1. Implement the previous suggestion (Vega and Ward 1989) to provide equipment to Centro de Deserollo Pesquero (CENDEPESCA) in order for them to monitor the biological diversity actually present at Los Cóbanos coral reef and the possible effects from pesticides and mariculture on this ecosystem. This takes on added importance with the proposed expansion of agriculture in the littoral area. If not already implemented, this equipment should be provided in time to allow baseline samples to be taken prior to pesticide sale by the project.

2. Increased agricultural activities being promoted by this project will place added pressure on some of the mangrove areas. Therefore, the suggestion by Vega and Ward (1989) for the establishment of a protective belt between crop land and the mangrove vegetation to reduce the amount of pesticides entering the estuarine ecosystems takes on added significance. The promotion of planting fast growing tree species to provide for

firewood would still be a good way to accomplish reduced contamination and reduce cutting pressure on mangrove swamps as well.

B. Suggestions related to those proposed by Higgins et al. (1988) as required in the Scope of Work, see Appendices 1 and 3:

1. Conduct research to determine the efficacy of less toxic, general use chemicals such as those being suggested for use on this project (Table 2). Adaptive research will be required to test chemical alternatives and to refine this list. Farmers are familiar with the use of certain chemicals (mostly restricted use) and will continue to use them unless additional information is made available and alternatives are offered. Alternatives must be equally priced or they will be undersold by the more toxic chemicals (Sections III.2.2, 2.3, and 2.4).

   FUSADES/DIVAGRO is conducting such trials for non-traditional export crops. CENTA should be encouraged by AID/ES to do similar research on the basic grains and other project crops as part of their IPM (MIP) projects.

2. The current exchange rate does not overly encourage the importation of agricultural inputs, including pesticides. However, the Central Bank (CB) still treats the importers of agrichemicals preferentially. AID/ES still should consider working with DDA, CB, and Economía Agropequaria to encourage the cancellation or restriction of the importation and/or sale of the more highly toxic chemicals. Higgins et al. (1988) further suggested an alternative of a quota system or tax levied on the more toxic chemicals to discourage their importation and use. Import or registration fees could then be used to directly support safety and monitoring programs and IPM research and development.

   There are a number of arguments that could be used against this approach. One of the most important is that it would just increase the amount of contriband chemical moving into El Salvador unless the same approach is used in all Central American Countries and Mexico during the same period. Another is that a high percentage of the pesticide used is on the basic grains and any increased costs will affect needed food production.

3. Salvadoran banks traditionally have offered bland loans for the purchase of pesticides, but not for alternative pest control measures. This practice amounted to a subsidy for pesticide inputs. AID/ES is currently working with the Agricultural Bank (BFA) to phase them out of the business of selling agrichemical inputs which should help reduce their promotion of pesticide use.

   Project farmers will have access to safety equipment through the cooperative microenterprises and will be required DLDP/ATAC technicians to use that equipment. This could be enhanced by requiring bank loan officers to attend pest/pesticide management classes to learn the need for such equipment. AID/ES indicated that the Agrarian Reform Credit Project 519-0307 is being extended for 1-2 more years and such training could be required in that project. Project loan officers should also be required to attend such training.

4. The recommendation that IPM should be an explicit component of all future agricultural development projects, including AID projects in El Salvador, has not been uniformly initiated. The Amendment No. 4 of the Agribusiness Development Project (519-0327) had an IPM component (Vega and Ward 1989), but none of the other projects (including this one) have had an IPM component.

5. The recommendations on training have mostly been addressed in previous items in this section, in previous AID/ES efforts (such as the Water Management Project as suggested by Higgins et al. 1988), and in the current project EA. However, public health official training and information needs still need to be addressed. It is recommended that the health program of AIFLD join the project in providing pertinent information on pesticide poisoning and treatment to health institutions in project areas. They should also be encouraged to register intoxication cases with the Ministry of Health. A program of choline esterase monitoring in the project area is recommended to verify training effectiveness (Annex 4).

CHAPTER THREE:

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Since there are no restrictions for the general location of agriculture, agroindustry, and aquaculture development projects, except for mangrove forests, the proposed activities might have a country-wide coverage. Actually, the promotion of non-traditional export products is being developed as a broad activity for the better utilization of the country's natural resources to generate better living conditions through the increase of employment opportunities and foreign exchange earnings. The increased production of basic grains will reduce import requirements, increase nutrition of poor farmers, and improve their economic well-being.

Therefore, a general overview of the country situation is deserved. Emphasis will be put on pest/pesticide management and the coastal areas.

1.0. COUNTRY OVERVIEW - The conditions Under Which the Pesticides are to Be Used, Including Climate, Flora, Fauna, Gengraphy, Hydrology, and Soils (h)[1]

El Salvador occupies the area of Central America between Honduras and Guatemala. It has a total area of 2,104,088 hectares (ha), which makes it the smallest in Latin America. The estimated population of El Salvador was approximately 4.5 million people in 1980 (Guevara, et al. 1985).

The country has a tropical climate. Temperatures, which vary little, average between 72 F and 82 F (22 C and 28 C), rarely falling below 60 F or rising above 90 F in the lower elevations. The weather is somewhat cooler in higher elevations. Annual rainfall ranges between 51-118 inches (1300-3000 mm), with the rainy season lasting from May through October.

Much of El Salvador is mountainous, with the highest point being El Pital in the northeast at 2,730 m (8,957 ft). The most pronounced geological feature is the chain of late Pleistocene volcanos in the south-central region of the country. They range in elevation from 2,133 m (el Chaparrastique in San Miguel) to 2,381 (El Lamatepec in Santa Ana). This zone occupies about 30% of the total area of the country.

[1] Letters in parentheses () indicate which of the twelve factors listed in 22CFR216, 216.3 (b)(1) is being addressed.

The Salvadoran shoreline has a total length in the order of 320 kms. (Guevara, et al. 1985). About 185 km. correspond to the Pacific Ocean from the Guatemalan border to Punta El Faro. The rest corresponds to the Golfo de Fonseca. The major concentration of areas suitable for acuaculture were identified along the shoreline of the Central Coastal Plain, which extends towards the East from La Libertad to the end of the Bahía de Jiquilisco. Actually half of the coastal sites identified are within this region: La Libertad, Río Jiboa, Río Lempa (Jaltepeque Estuary), Jiquilisco Estuary, El Triunfo, and Bocana La Chepona. The major estuary of the country, Jaltepeque and Jiquilisco are located in this area.

Three general areas were identified for shrimp production along the shoreline of the Occidental Costal Plain: Barra de Santiago, Metalío, and Acajutla. In this sector of the coast closer to the Guatemalan border there are relatively small estuaries and coastal lagoons. The major estuary in the area is El Zapote followed by smaller ones at Bocana Garita Palmera, La Paz's River mouth, and San Juan de Metalío. The other three areas considered for marine aquaculture include two located completely on the Golfo de Fonseca: La Unión and Río Goascorán and one which is on both sides of Punta EL Faro, the combination is called the Tamarindo Estuary.

The four fresh water areas identified for aquaculture include: Cerrón Grande, Nueva Concepción, Candelaria de La Frontera and Sonsonate. The first two sites are associated with the Lempa River. Cerrón Grande is the major hydropower reservoir in the country. The proposed activity is the cage production of tilapia. In the other two sites the production of fresh water prawns may be suitable.

Mangrove forests are salt water swamps, which have periodical flooding caused by tidal water movement. Mangroves are a special kind of plant species that have special ways of getting fresh water from salt water. Some of them use the sun's energy to transpire water and the pull within the system draws water into the roots, leaving some salt behind. Other plants use energy derived from photosynthesis, to secrete salt through the leaves. The energy demands for salt adaptations decrease the natural plant diversity.

Another characteristic of mangrove areas is the influx of fresh water. The fresh water runs in from the rivers and tides move salt water in and out. Tidal energy interacting with the plants makes a network of pools and channels for water movement. Through these channel and pool systems the tidal exchange also brings in and out fish, plankton, and larval stages of animals such as shrimp.

The energy subsidies from the influx of fresh water which brings in nutrients and the tidal influxes help to make mangrove areas very productive ecosystems. The low plant diversity is compensated by a very high diversity of animals. Many species of fish and shellfish, including shrimp, require mangrove ecosystems and associated estuaries for the completion of their life cycles.

The figure for the total mangrove forest area in El Salvador differs somewhat from various authors. Guevara et al. (1985) mentioned 45,000 has. Miranda (1986), cited by Horna (1987), consider that the total extension is in the order of 35,200 has. Areas of water corresponding to the associated estuaries might account for the difference. The mangrove ecosystems are concentrated around three major areas. Miranda (1988) considers that about 95% of the total mangrove surface is concentrated in the Departments of La Paz (Jaltepeque - 17.8%), Usulután (Jiquilisco - 58.2%) and La Union (Golfo de Fonseca - 18.6%).

The elimination of pressures affecting mangrove ecosystems is not the objective of this report. However, they are interesting to consider because the decrease of mangrove area can affect the abundance of shrimp and post-larvae required for the expansion of mariculture enterprises. Guevara et al. (1985) mention that as much as 25% of the mangrove area might have been eliminated in the past in order to convert them to salt producing facilities. They also mentioned that the building of ridges that alter the normal water circulation pattern has been a common process of mangrove destruction.

Other factors affecting mangrove ecosystems in El Salvador include the utilization of mangrove wood for construction, charcoal production, firewood, and bark extraction for supplying the leather industry with tannins. Jorge Ramos from FUSADES-DIVAGRO (Ward and Vega 1989), considers that the pressures on mangroves are decreasing because the leather industry is no longer requesting mangrove bark, as the supply of synthetic materials has become more economical and most salt facilities have gone into solar heating. However, he considers that a significant amount of firewood is still obtained from the mangrove areas.

An additional threat to mangrove ecosystems, although more directly related to the animal community in the associated estuaries, has been heavy pesticide utilization associated with cotton growing in past years. Extensive areas around the mangrove swamps were planted with cotton and the agricultural runoff could have transported pesticides of low decomposition rates to these ecosystems. This can affect shrimp mariculture turning some of the otherwise suitable sites into inappropriate ones because of the pollution.

Los Cóbanos Coral Reef is a unique feature of the Salvadoran coastal area, located to the South-East of Puerto Acajutla. It is a coral reef formation, which actually extends into Guatemalan waters as well. The reef has not been studied adequately. Its extension is not exactly known, but might be in the order of 8,000 ha. (Guevara et al. 1985). Orellana (1986) published on the fish species that live in the waters associated with the reef.

Coral reefs are special formations that develop under conditions of shallow sea waters, with energy inputs from strong wave and current actions. The high primary and secondary production of these ecosystems maintain a high biological diversity in the reef itself as well as in the surrounding waters.

Most corals are colonial jellyfish that form skeletons underneath their bodies. They get most of their food and energy for skeleton formation from the photosynthesis of symbiotic algae called zooxanthellae, which live in their tissue. They also capture small organisms with their stinging cells. The nutrients released from metabolism are used by the algae. The penetration of light for algae photosynthesis and the presence of strong currents or wave action to supply oxygen for respiration, nutrients for growth, and carbonates for skeletons and supplementary food, are physical requirements for this ecosystem.

Los Cóbanos coral reef has been affected adversely by several activities implemented along the coast, such as the presence of a nearby cement factory, the country's oil refinery, and the port of Acajutla. However, the major effect on this reef has probably been caused by the antropic acceleration of the natural erosion process. This results from a heavy sediment load transported by the river system. During the rainy season the ocean water becomes loaded with silt that restricts light penetration. A belt of about 2-3 miles wide of darkened water could be observed during a flight following the coastline in 1989 (Vega and Ward 1989). The effects that all these activities and human induced processes have had on the reef can not be exactly known, because of the lack of basic information.

Agriculture employed 60% of the population of El Salvador since 1982 (Guevara et al. 1985) and has historically played a major role in the economy. About 30% of the surface area of 21,000 sq. km. (13,050 sq. mi.) is arable or permanent cropland (Guevara et al. 1985). Traditionally, agricultural emphasis has been on the export crops of coffee, cotton, sugar, and meats. These crops plus the export of fisheries products accounted for 19.8% of the 1980 GDP (Guevara et al. 1985).

Depressed worldwide market for traditional export crops have forced farmers to attempt to diversify into non-traditional crops both for export and to replace imports. These non-traditional

export and import substitution crops include winter fruits and vegetables, corn, and sorghum. Many of the products are produced by small- or medium-scale farmers who work closely with agribusinesses. Agribusinesses store, package, process, and market the farmers' production and, at times, help obtain credit, technical advice, and services such as land preparation.

The bulk of basic food staples are produced on small or medium farms; nearly 93% of the farms are less than 5 ha, occupying less than 18% of the total farmland. Only 1.5% of the farms exceed 50 ha, but these farms occupy more than half (51.3%) of the total farmland.

Of the eight major soil use groups, the agronomically useful ones (Types I-IV) cover about 690,000 ha. Over 524,000 ha. are already in farms with annual crops. Soil erosion is the most serious problem affecting the natural resource base in El Salvador. Rampant habitat destruction and the deliberate introduction of exotic animal species have depleted much native wildlife populations. Threatened or endangered fauna includes 5 fish species, at least 3 amphibians, 21 reptiles, 77 bird species, and 21 mammal species. Endangered plants includes 65 tree species, 53 orchid species, and 8 bromeliads. Little is known of most endangered fauna, while marine fauna has been mostly ignored (see Appendix 4).

2.0. PESTICIDE USE

Abundant anecdotal information and the EA produced by Higgins, et al. (1988) suggests that increasing abuse of pesticides is causing chronic or acute poisoning, contaminating agricultural products, and stimulating resistant pests. The general problem in pesticide use is thought to be inadequate training. Only 30% of the pesticides are applied by trained personnel.

According to the Statistical Unit of the MOH, there were 1,558 suspect poisoning cases not involving medicines, in the first quarter of 1990 (Appendix 5). This included the following causes:

Products	No. Cases	No. Dead	% dead (of total)
Organophosphates and Carbamates	594	126	68
Chlorinated hydrocarbons	37	0	0
Other insecticides	232	49	27
Animal stings or bites	135	9	5
Cyanide	3	0	0
Other products not specified	12	1	>1
Totals	1013	185	100

The data are partitioned by sex and age groups in the detailed data in Appendix 5.

2.1. EPA Registration Status of the Proposed Pesticides (a)

In the US, pesticides are registered by the Environmental Protection Agency (EPA). The EPA registers a pesticide product in one of two categories: "restricted use" or "general use". A restricted use pesticide is available for purchase and use only by pesticide applicators who are certified by law. It potentially presents a very high toxicity and/or environmental hazard. A general use pesticide, by contrast, is available for purchase and use by the general public. It is not AID policy to provide highly toxic pesticides to small farmers.

Table 1 shows the pesticides requested for approval on the project. Table 2a shows the pesticides approved by AID/W for use in the Democratic Labor Development Project. A few products not currently registered for use in El Salvador are also included. These products are registered for use in the U.S. and should be considered for importation for use on the project. Approval is subject to registration in El Salvador. Three RU insecticides that should be considered for special submission to AID\W for approval for use on the project are given in Table 2b. Table 3 shows pesticides restricted for use in the US and/or El Salvador or those not registered in the US but still available in El Salvador. NONE of the pesticides listed in Table 3 are considered suitable for use in the crops proposed for production in the DLDP or agricultural microenterprise components of the DLDP. However, it will be proposed in the recommendation section that AID/Washington give consideration to giving project personnel that have undergone appropriate (U.S. equivalent) training a "certification" to supervise the application of selected restricted use (RU) pesticides. A few suggested RU pesticides are included in Table 2b for which approval should be sought. This would allow use of RU pesticides

Table 1. Status of pesticides and other agrichemicals requested for use on the AIFLD/DLDP-ATAC in El Salvador.

Trade name and (common name)	Toxicity Category/ EPA signal word[1]	Acute Oral LD_{50} (mg/kg)	Status[2] /Reason
INSECTICIDES			
Caracolicida (metaldehyde)	II-III/CW	250-1000	A:See Table 2a footnote 5
Counter (terbufos)	I/D	3.5-9.2	R:EPA's Restricted Use
Curaterr (carbofuran)	I-II/WD	11	R:EPA's Restricted Use[3]
Decis (deltamethrin)	-	129	R:Not Registered in U.S.
Folidol M 48 (methyl parathion)	I/D	50-62	R:EPA's Restricted Use
Furadan (carbofuran)	I-II/WD	11	R:EPA's Restricted Use[3]
Lorsban 2.5G (chlorpyrifos)	II/WC	96-270	A:See Table 2a for Crops
Marshall (carbosulfan)	I-II/WD	209	R:EPA Registration Pending
Nuvacron (monocrotophos)	/W	8-23	R:EPA Registration cancelled
Orthene (acephate)	III/C	866-945	A:See Table 2a for Crops
Tamaron 600 (methamidophos)	I/D	20	R:EPA's Restricted use
Thiodan (endosulfan)	I/D	22.7-100	R:EPA's Restricted use
Volaton 2.5G (phoxim)	III/-	ca.2,000	R:Not Registered in U.S.
FUNGICIDES			
Bayleton (triadimefon)	III/WC	1020-1085	A:See Table 2a for Crops
Benlate (benomyl)	IV/C	>10,000	A:See Table 2a for Crops
Daconil (chlorothalonil)	IV/WD[4]	>10,000	A:See Table 2a for Crops
Dithane M45 (mancozeb)	IV/C	11,200	A:See Table 2a for Crops
Hinosan (edifenphos)	II/-	100-260	R:Not Registered in U.S.
Copper oxychloride	III/C	1,000	A:See Table 2a for Crops

See page 3 of 3 for footnotes.

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Table 1. Status of pesticides and other agrichemicals requested for use on the AIFLD/DLDP-ATAC in El Salvador. (Cont'd.)

Trade name and (common name)	Toxicity Category/ EPA signal word[1]	Acute Oral LD_{50} (mg/kg)	Status[2] /Reason
HERBICIDES			
Atrazine (atrazine)	III/C	1780	A:See Table 2a for Crops
Diuron (diuron)	III/C	3400	A:See Table 2a for Crops
Gramoxone (paraquat)	II/D	150	R:EPA's Restricted use
Hedonal 720 (2,4-D)	III/C[5]	699	A:See Table 2a for Crops
Karmex (diuron)	III/C	3400	A:See Table 2a for Crops
Lasso (alachlor)	III/D[6]	1800	A:See Table 2a for Crops Pending registration in ES
Latigo (glyphosate)	III/W	4300	A:See Table 2a for Crops
Rambo	-	-	R:Not registered in U.S. or ES
Roundup (glyphosate)	III/W	4300	A:See Table 2a for Crops
Surcopur (propanil)	II-III/CW	2500	A:See Table 2a for Crops[7]
FOLIAR FERTILIZER (Foliares)			
Bayfolan	-	-	A:Not restricted in U.S.
Complesal	-	-	A:Not restricted in U.S.

See page 3 of 3 for footnotes.

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Table 1. Status of pesticides and other agrichemicals requested for use on the AIFLD/DLDP-ATAC in El Salvador. (Cont'd.)

Trade name and (common name)	Toxicity Category/ EPA signal word[1]	Acute Oral LD_{50} (mg/kg)	Status[2] /Reason
ADJUVANTS, STICKERS, SPREADERS (ADHERENTES)			
Disapen	-	-	A:Not restricted in U.S.
Pegason	-	-	A:Not restricted in U.S.

[1] Signal words are D=Danger, W=Warning, and C=Caution.
[2] Status: A=Approved, R=Rejected for use on project by AID/W.
[3] All products RU except granules containing 5% or less active ingredient.
[4] Wettable powders with 75% active ingredient cause eye irritation.
[5] The EC formulation toxicity category and signal word are given here.
[6] Based on eye and skin irritation.
[7] Approved provided US label safety requirements are followed.

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Table 2a. List of pesticides approved for use in the AID/ES AIFLD/DLDP-ATAC Project on requested crops. 1,2/

Common name and selected trade name(s) 1,2,3,4/	EPA Toxicity category	Status of EPA registration for use on requested crops 1,2,5,6,7,8/																				
		beans dry	beans snap	coffee	corn field	corn sweet	garlic	cantaloupe	melons	marigold	okra	onion	orange	pasture grass	plantain	rice	sesame	sorghum	tomato	watermelon	yucca
INSECTICIDES/ACARICIDES																						
*acephate (Orthene)	III	X	X	-	-	-	-	TP8/	TP	-	-	-	-	X	-	-	-	-	-	TP	-
*allethrin (Pynamin)	III	E7/	E	-	E	E	E	-	X10/	-	-	E	X	-	-	-	-	E	E	-	-
Bt (Bactospeine, Thuricide)	IV	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
*carbaryl (Sevin)	III	X	X	-	X	X	-	NT	X	-	X	-	-	X	X	X	-	X	X	NT	-
carbofuran (Furadan)(RU,SR)	II	-	-	X	X	X	-	NT	X	-	-	-	-	-	X	X	-	X	-	NT	-
chlorpyrifos (Lorsban)	II	X	X	-	X	X	-	-	-	-	-	X9/	X	-	X	-	-	X	-	-	-
diazinon (Basudin, Diazinon)	II/III	NT	X	X	X	X	-	X12/	X	-	-	X	-	X	X	-	-	X	X	-	-
*dicofol (Kelthane)	II/III	X	X	-	-	-	-	X	X	-	-	-	X	-	-	-	-	-	X	X	-
dimethoate (Cygon, Perfektion)	III	X	X	-	X	-	-	NT	X	-	-	-	X	-	-	-	-	X	X	NT	-
*dinocap (Karathane)	III	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	X	-
fenthion (Fenthion)	III	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-
*hydramethylnon (Amdro)	III	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-
malathion (Belation, Malathion)	III	X	X	-	X	X	X	NT	X	-	-	X	X	X	-	X	-	X	X	-	-
metaldehyde	II/III	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
*methoxychlor	IV	X	X	-	-	-	-	NT	X	-	-	-	-	X	-	-	-	-	X	-	X
*phosmet (Imidan)	II	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-
*piperonyl butoxide (Butacide)	III	X	X	-	-	-	-	-	X10/	-	-	-	X	-	-	X	-	X	X	-	-
propargite (Comite, Omite)	III	X	X	-	X	X	-	-	-	-	-	-	X	-	-	-	-	X	-	-	-
*pyrethrins (Pyrenone)	III	-	-	-	-	-	-	-	X10/	-	-	-	X	-	-	X	-	X	X	-	-
*ronnel (Korlan)	III	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
*rotenone (Nicouline)	I-III	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
sulfur (Kumulus)	IV	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
*tetradifon (Tedion)	III/IV	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-	-	-	X	NT	-
*tetrachlorvinphos (Gardona)	III	X	X	-	X	X	-	-	-	-	-	-	-	X	-	-	-	-	X	-	-
thiodicarb (Larvin)	II	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*trichlorfon (Dipterex, Dylox)	II	X	X	-	X	X	-	-	-	-	-	-	-	X	X	-	-	-	X	-	-

See page 4 of 4 for footnotes.

Table 2a. List of pesticides approved for use in the AID/ES AIFLD/DLDP-ATAC Project on requested crops. 1,2/ (Cont'd).

Common name and selected trade name(s) 1,2,3,4/	EPA Toxicity category	Status of EPA registration for use on requested crops 1,2,5,6,7,8/																				
		beans dry	beans snap	coffee	corn field	corn sweet	garlic	cantaloupe	melons	marigold	okra	onion	orange	pasture grass	plantain	rice	sesame	sorghum	tomato	watermelon	yucca
FUNGICIDES																						
*anilazine (Dyrene)	IV	-	-	-	-	-	X	NT	X	-	-	-	-	-	-	-	-	-	-	-	-
benomyl (Benlate)	IV	X	X	-	NT	X	X	NT	X	-	-	-	-	-	X	X	-	-	X	NT	-
*captan (Captan, Orthocide)	IV	X	X	-	NT	X	X	X	NT	-	-	X	X	-	-	-	-	-	X	X	X
chlorothalonil (Daconil)	IV	X	X	X	NT	X	-	NT	X	-	-	X	-	-	X	-	-	-	X	NT	-
copper hydroxide (Kocide)	III	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
copper oxychloride (Cuprsvit)	III/IV	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
*DCNA (Dichloran, Botran)	IV	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-
*DCPA (Dacthal)	IV	X	-	-	X	X	X	X	X	-	-	X	-	-	-	-	-	-	X	X	-
*dinocap (Karathene)	III	-	-	-	-	-	-	X	X	-	-	X	-	-	-	-	-	-	-	X	-
*ferbam (Carbamate)	IV	X	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	X	-	-
iprodione (Rovral)	III	X	X	-	-	-	X	-	-	-	-	X9/	-	-	-	X	-	-	-	-	-
*fosetyl-al (Alliette)	III	-	-	-	-	-	-	-	-	-	-	X9/	-	-	-	-	-	-	-	-	-
mancozeb (Dithane M-45) (SR)	III	TP	-	-	X	X	-	NT	X	-	-	X9/	-	-	X	X	-	-	X	-	-
maneb (Manzate, Dithane)	III	X	X	-	X	X	-	NT	X	-	-	X	-	-	X	-	-	-	X	-	-
metalaxyl (Ridomil)	II	X	X	-	-	-	-	X	X	-	-	X	-	X	-	-	-	-	X	X	-
*napropamide (Devrinol)	III	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*propiconazole (Tilt)	III	-	-	-	TP	TP	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-
sulfur (Kumulus)	IV	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
*streptomycin	IV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-
*thiabendazol (Mertec)	III	X	NT	-	-	-	-	X	-	-	-	-	-	-	X	X	-	-	-	-	-
thiram (Promasol)	III	-	-	-	-	-	-	-	-	-	-	X9/	-	-	X	-	-	-	X	-	-
thiophanate-methyl (Cycocin)	IV	X	X	-	-	-	-	NT	X	-	-	-	-	-	X	-	-	-	-	NT	-
triadimefon (Bayleton)	II	-	-	-	-	-	-	X	X	-	-	-	-	X	-	-	-	-	-	X	-
triadimenol (Bafidan, Baytan)	III	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
*triforine (Funginex)	IV	-	-	-	-	-	-	X	NT	-	-	-	-	-	-	-	-	-	-	X	-
*vinclozolin (Ornalin)	IV	TP	TP	-	-	-	-	-	-	-	-	X9/	-	-	-	-	-	-	X	-	-
*zineb (Lonacol)	III	X	X	-	X	X	-	-	X	-	-	X	-	-	-	-	-	-	X	-	-
*ziram (Cuman)	III	X	X	-	-	-	-	-	X	-	-	X	-	-	-	-	-	-	X	-	-

See page 4 of 4 for footnotes.

Table 2a. List of pesticides approved for use in the AID/ES AIFLD/DLDP-ATAC Project on requested crops. 1,2/ (Cont'd).

Common name and selected trade name(s) 1,2,3,4/	EPA Toxicity category	Status of EPA registration for use on requested crops 1,2,5,6,7,8/																				
		beans dry	beans snap	coffee	corn field	corn sweet	garlic	cantaloupe	melons	marigold	okra	onion	orange	pasture grass	plantain	rice	sesame	sorghum	tomato	watermelon	yucca
NEMATICIDES																						
carbofuran (Furadan)(RU)	II	-	-	X	X	X	-	NT	X	-	-	-	-	-	X	X	-	X	-	NT	-
HERBICIDES																						
*alachlor (Lasso)	III	X	NT	-	X	X	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-
amytryne (Gesapax)	III	-	-	-	X	X	-	-	-	-	-	-	X	-	X	-	-	-	-	-	X(R7/)
atrazine (Gesaprim)	III	-	-	-	X	X	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-
bentazone (Basagran)	III	X	X	-	X	X	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-
*butylate (Sutan)	III	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*dalapon (Dalapon)	II	T	T	X	X	X	-	T	T	-	-	-	X	X	X	-	-	X	-	-	-
diquat (Reglone)	II	T	T	-	T	T	-	T	T	-	-	-	T	T	-	-	-	-	-	T	T
diuron (Direx, Karmex)	III	T	-	-	T	T	-	-	-	-	-	-	-	X	X	-	-	X	-	-	-
*EPTC (Eptam)	III	X12/	X12/	-	X12/	X12/	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-
*ethalfluralin (Sonolan)	IV	X	NT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
fenoxyprop-ethyl (Furor)	III	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
fluzifop-butyl (Fusilade)	III	-	-	X11/	-	-	X12/	-	-	-	-	X9/	-	-	-	-	-	-	-	-	-
glyphosate (Roundup)	III	T	T	T	-	-	-	T	T	-	-	T	-	T	T	-	-	-	-	T	-
*linuron (Afalon, Linex))	III	-	-	-	X	X	-	-	-	-	X	-	-	-	-	-	-	T	-	-	-
*metolachlor (Dual)	III	-	X12/	-	X	X	-	-	-	-	-	-	-	T	-	T	-	-	-	-	-
metribuzin (Lexone, Sencor)	III	-	-	-	T	T	-	-	-	-	-	-	-	T	-	X	-	-	X	-	-
molinate (Ordram)	IV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
oxyfluorfen (Goal)	II	-	-	X	X	NT	-	-	-	-	-	X9/	-	-	X	-	-	-	-	-	-
pendimethalin (Herbox, Prowl)	II	X	X	-	X	X	T	-	-	-	-	-	-	-	-	T	-	X	-	-	-
*propachlor (Ramrod)	III	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
propenil (Propanyl)	III	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
*sethoxydim (Checkmate, Poast)	III	T	T	-	T	T	-	X	X	-	-	-	-	-	-	-	-	-	X	X	-
simizine (Princep)	III	-	-	-	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
triflurilin (Treflan)	III	X12/	X12/	-	T	NT	-	T	T	-	X12/	-	-	-	-	-	-	-	X12/	T	-
2,4-D (Dacamine)	IV	-	-	-	X	X	-	-	-	-	-	-	-	X	-	X	-	X	-	-	-

See page 4 of 4 for footnotes.

Table 2a. List of pesticides approved for use in the AID/ES AIFLD/DLDP-ATAC Project on requested crops. 1,2/ (Cont'd).

Common name and selected trade name(s) 1,2,3,4/	EPA Toxicity category	Status of EPA registration for use on requested crops 1,2,5,6,7,8/																				
		beans dry	beans snap	coffee	corn field	corn sweet	garlic	cantaloupe	melons	marigold	okra	onion	orange	pasture grass	plantain	rice	sesame	sorghum	tomato	watermelon	yucca
PLANT GROWTH REGULATORS																						
*ethephon (Ethrel)	III	-	-	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*frutione	III	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POST HARVEST TREATMENTS																						
*thiabendazole	III	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RODENTICIDES																						
Warfarin	III	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1/ An "X" in the crop column indicates EPA registration for that crop. All products must be used according to the safety requirements on the EPA approved label. Those products in this table without an asterisk (*) are registered by EPA and in El Salvador (ES) by MAG/DOA and are approved by AID\W for use on this project.

2/ Product must also be registered for use in El Salvador prior to use. An asterisk (*) in front of the name indicates it is not registered for use in ES. AID/W gives approval for the use of those products listed in this table when they receive registration status in ES.

3/ RU indicates all or some formulations are restricted use; the 5% granular formulation is proposed here.

4/ SR indicates some the product is under special review.

5/ NT indicates there is no tolerance set by EPA for that crop. Some product only for use around field margins. "T" indicates an EPA tolerance for that crop.

6/ User must follow US label restrictions.

7/ Exempt (E) from a tolerance when applied to growing crops.

8/ TP indicates tolerance is pending approval. R indicates EPA has established a regional tolerance for that crop.

9/ Tolerance for dry bulb onions only.

10/ Tolerance for muskmelons only.

11/ Nonbearing trees only.

12/ Product recommended in literature for use on that crop, but no tolerence was given in the Chemical News guide. Follow EPA label restrictions to prevent residues in the harvested crop.

SOURCES: Chemical News Guide through August 1991 and various State Extension Guides for the crops listed, see Bibliography for citations.

Table 2b. List of restricted use insecticides suggested for approval for use in the AID/ES AIFLD/DLDP-ATAC Project on requested crops. 1,2/ (Cont'd).

Common name and selected trade name(s) 1,2,3,4/	EPA Toxicity category	Status of EPA registration for use on requested crops 1,2,3/ beans dry	beans snap	cof-fee	corn field	corn sweet	garlic	cantaloupe	melons	marigold	okra	onion	orange	pasture grass	plantain	rice	sesame	sorghum	tomato	watermelon	yucca
INSECTICIDES/ACARICIDES	Selected RU3/ insecticides to consider for approval for use as "emergency" control materials. See Table 9 for more hazard data.																				
fenvalerate (Belmark, Pydrin)	III	X	X	-	X	X	-	X	X	-	X	-	-	-	-	-	-	-	X	X	-
*fluvalinate (Mavrik, Spur)	II	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
permethrin (Ambush, Pounce)	III	-	-	-	X	X	X	-	-	-	-	X5/	-	X	-	-	-	-	X	-	-

1/ An "X" in the crop column indicates EPA registration for that crop. All products must be used according to the safety requirements on the EPA approved label. These RU products and any others that the project deems necessary to be approved must be submitted to AID/ES and then to AID/W for special approval before use on the project.

2/ Product must also be registered for use in El Salvador prior to use. An asterisk (*) in front of the name indicates it is not registered for use in ES.

3/ RU indicates all or some formulations are restricted use.

4/ User must follow US label restrictions.

5/ Tolerance for dry bulbs only.

SOURCES: Chemical News Guide through August 1991 and various State Extension Guides for the crops listed, see Bibliography for citations.

Table 3. Restricted and/or U.S. prohibited pesticides currently used in El Salvador.

1. Alpha-cypermethrin (DOMINEX, BALA); Insecticide[1]
2. Aluminum phosphide (DETIA GAS-EX-T, PHOSTOXIN); Fumigant.
3. Azinphos methyl (GUTHION, GUSATION); Insecticide
4. Bifenthrin (TALSTAR); Insecticide
5. Buprofezin (APPLAUD); Insecticide[1]
6. Butachlor (MACHETE, LAMBAST); Herbicide[1]
7. Carbofuran (FURADAN, CARBUGRAN); Insecticide[2]
8. Carbosulfan (ADVANTAGE, MARSHALL, POSSE); Insecticide, Nematicide, Acaricide
9. Cyfluthrin (BAYTHROID, BAYTROID, SOLFAC, BULLDOCK, CIFLUTHRIN); Insecticide
10. Cyhalothrin (KARATE); Insecticide
11. Cypermethrin (AMMO, ARRIVO, CYMBUSH, RIPCORD); Insecticide
12. Deltamethrin (DECIS, K-OBIOL); Insecticide
13. Demeton-s-methyl (METASYSTOX); Insecticide
14. Disulfoton (DI-SYSTON, SOLVIREX); Insecticide, Acaricide
15. Endosulfan (THIODAN): Insecticide
16. Esfenvalerate (ASANA, HALMARK); Insecticide
17. Ethroprop (MOCAP); Insecticide
18. Fenamiphos (NEMACUR); Nematicide, Insecticide
19. Fenpropathrin (HERALD); Insecticide[1]
20. Fenvalerate (PYDRIN, BELMARK, SUMACIDIN); Insecticide
21. Flucythrinate (PAY OFF, AASTAR); Insecticide
22. Isazophos (BRACE, MIRAL, TRIUMPH); Insecticide[3]
23. Isofenphos (OFTANOL, PRYFON); Insecticide
24. Methamidophos (TAMARON, QUIMA TD, MTD,FORMUTOR); Insecticide
25. Methyl parathion (FOLIDOL, PARATION METILICO, QUMATION, BELLOTION, FOLIPOLVO, FORITHION); Insecticide
26. Methidathion (SUPRACIDE); Insecticide
27. Methomyl (LANNATE, PILLARMATE); Insecticide
28. Mirex (MIREX); Insecticide[1]
29. Monocrotophos (AZODRIN, NUVACRON, PILLARTIN, QUIMADRIN); Insecticide[2]
30. Omethoate (FOLIMAT); Insecticide, Acaricide[1]
31. Oxamyl (VYDATE); Insecticide, Nematicide
32. Paraquat (GRAMOXONE, PILLARXONE); Herbicide
33. Permethrin (POUNCE, AMBUSH, TORPEDO); Insecticide
34. Phorate (THIMET); Insecticide
35. Phoxim (VOLATON); Insecticide[1]
36. Profenofos (CURACRON, TAMBO, SELECRON); Insecticide, Acaricide.
37. Prothiophos (TOKUTHION, TOKUTION); Insecticide[1]
38. Terbufos (COUNTER); Insecticide, Nematicide[4]
39. Toxaphene-Methyl Parathion (QUIMATOX-M); Insecticide[5]

See footnotes on next page.

Table 3. Restricted and/or U.S. prohibited pesticides currently used in El Salvador. (Con't)

FOOTNOTES

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[1] These products are not permitted for use in U.S.

[2] Only liquid formulations are restricted; granules were under special review but most uses were voluntarily withdrawn by the manufacturer.

[3] For use on non-food crops only in U.S.

[4] Only formulations with 15% ai or greater are restricted.

[5] Toxaphene not permitted for use in U.S.

on the fields of farmers in the ATAC phase of the project as well as in demonstration plots. Growers already use most of the restricted use pesticides in ES. It will put the ATAC personnel and project growers with AID/SF credit at a distinct disadvantage to growers without AID credit if they are not allowed to utilize these pesticides where required in emergency situations when proposed alternatives have failed to control a seriously damaging pest.

AIFLD, FUSADES/DIVAGRO, and the MAG/DDA plant protection and agromedical groups are aware of dimethoate, paraquat, synthetic pyrethiod, and metaldehyde hazards. The DLDP does not plan to distribute three of these pesticides to farmers, unless needed on an emergency basis to control a major pest outbreak. Otherwise, use of dimethoate would be for small-scale experimentation, training, demonstrating safe use to farmers, or small-scale control programs carried out by project staff. Metaldehyde can be used with the restriction that the label must bear the words in Spanish "this pesticide may be fatal to children and dogs or other pets if eaten. Keep children and pets out of treated area". For all cases, ATAC technicians will see that protective clothing will be worn.

Paraquat presently is used widely in ES, and there is no known substitute per se. A partially effective alternative is the herbicide glyphosate (ROUNDUP). Use of glyphosate would greatly reduce the hazards (see Table 4 for comparison in toxicity of paraquat and glyphosate). Research in the Cook Islands (South Pacific) and other areas has shown that, when mixed with the common fertilizer urea, glyphosate is effective at reduced rates and, therefore, less costly. This AID Project affords another opportunity to test this approach in ES and to seek other cost-effective alternatives, both chemical and nonchemical, to paraquat and other pesticides that present high risks.

The synthetic pyrethroids are presently widely used in ES, and they are aware of the fish, aquatic arthropod, and bee hazards. Those requested for consideration of special approval will only be used in emergency situations as previously discussed. A detailed discussion is given in Section 2.5 and 2.6 of this program.

The ATAC phase of this project features an effective training component on pesticide safety and will provide protective equipment and clothing to project staff and will make them available to farmers in the microenterprises and encourage their use. In addition, the proposed institutional linkages of the project will provide considerable technical assistance in pesticide management that is research based to seek safe, cost-

effective pesticide application techniques and alternative control strategies.

Not all the pesticides used in El Salvador (Tables 1,2 and Appendix 5) have been registered by EPA for use in the US (noted as "not registered") . However, the FAO and WHO of the United Nations have recommended "residue tolerances" for some of these materials. A residue tolerance is the amount (expressed in parts per million) of a pesticide that may legally and safely remain in or on any raw farm products at the time these products are sold for consumption by humans or livestock. Another aspect of the project will be to provide assistance in seeking alternative, non-restricted use pesticides for use on project crops that meet EPA criteria. This could include special requests by AID/ES to AID/W to use some of these less toxic products based on WHO/FAO tolerances. None are being requested at this time as part of the EA, due to numerous EPA registered products being available for registration with MAG/DDA and imported for use on the project. If adequate products from this list cannot be imported, additional products may need to be selected for submission for approval.

Four of the pesticides in Table 2a were issued (or have ingredients that have been issued) a so-called "Rebuttable Presumption Against Registration" (RPAR) by EPA:

*captan (CAPTAN).
*carbofuran (FURADAN).
*mancozeb (DITHANE M-45)
*maneb (MANZATE, DITHANE)

The RPAR process is now designated as "Special Review" to gather information and stimulate public debate about a pesticide being scrutinized because of adverse effects on human health or the environment. If at the end of this process the risks are found to outweigh the benefits, the pesticide may be cancelled (banned) or greatly restricted in the US. Section III.2.5 discusses why a Special Review has been issued for captan (CAPTAN) and carbofuran (FURADAN).

2.2. Basis for Selection of the Proposed Pesticides (b)

After research conducted by Dr. Saul Edgardo Contreras Galvez (QUINTEGRA/DLDP) and discussions with the MAG/DDA Director, Dr. Rolando Martinez Melara, Aristides Magana, and Ing. Plutarco Elias Echegoyen Ramos; Ricardo Antonio Molins and César Hananía Chavez (FUSADES/DIVAGRO); and Stanley Kuehn (CLUSA-Farmer Cooperative Associations), and Sr. Raul Eduardo Góchez S. and Ing. Oscar A. Irigoyen (APA-Agrichemical Dealers Association), the lists in Tables 2, 3, and Appendix 5 were compiled. The pesticides in Table 2a that are registered for use in El Salvador, are locally available, and are presumed to be

effective. Table 2a also includes other general use pesticides that have been issued tolerances by EPA for some of the proposed project crops. These products can be used only if they can be registered for use in ES. Some of them may be needed to replace more toxic products that cannot be approved for use on the project. There is a lack of research data for all crops in the country and, therefore, little published data are available to judge effectiveness. It is the goal of the proposed linkages and suggestions to support the research phase of other projects to address part of these needs and the pesticides being investigated include, but are not limited to, those on the list of approved pesticides.

A list of pesticides currently available for purchase in ES (Appendix 5) which are considered to be too toxic for use in the project or which have been cancelled/suspended by EPA is in Table 3. A list of pesticides that have been banned from use in ES are listed in Appendix 5. A list of all pesticides currently registered in El Salvador also appears in Appendix 5. The current status of EPA registration for each product is indicated.

2.3. Effectiveness of the Requested Pesticides for the Proposed Uses (f)

The pesticides listed in Table 2 have been evaluated under a variety of conditions, including those of the Central American region, and found to be effective for some of the pests attacking the crops indicated. However, as previously indicated, little published data are available on the efficacy of these products in El Salvador. Few pesticides are registered in the U.S. for use on crops such as coffee, plátano, sesame, and yucca, being proposed for production as project crops. Therefore, one of the objectives of the institutional research linkages of the project should be to encourage research on the efficacy, residue dissipation, and cost/benefit data on products needed to control those pests on those crops where registered, non-restricted use pesticides are not available. Where residue data are needed, consideration should be given to the use techniques being utilized by the Regional IR-4 Project specifically designed for such studies. This information can be obtained by contacting the Interregional Research Project No.4, New Jersey Agricultural Experiment Station, P.O. Box 231, Rutgers University, New Brunswick, NJ 08903-0231; Ph. 201-932-9575; FAX 210-932-8481.

Another reason for needing the research project linkages is the loss of many of the "minor use" registrations of some of the general use pesticides during the re-registration process that is currently in progress in EPA. An example of the impact this can have is the case of diazinon. Use on proposed project crops such as beans and peas has been dropped. Additional crop

registrations for CIBA-Geigy along with an extensive list of other proposed changes by other companies are included in Annex 6 of the recent EA by Vega and Ward (1989). A copy of a summary of the National Resources Defense Council (NRDC) law suit also is included as it may lead to legislation in this area. The impact of other pending legislation such as the Dingle Amendment could also critically impact the importance of this proposed component.

A sample of the pest management guides currently in use in AIFLD and FUSADES/DIVAGRO can be found in Appendix 6. Dr. Saul E. Contreras G. prepared a list of pests and diseases attacking most of the proposed project supported crops. Pesticides normally used for each pest along with possible alternative products and available IPM strategies are also listed. The original list was reviewed and modified by project personnel to fit project farmers. The final list is included in Appendix 6. As can be noted, most of these products are in the EPA restricted use category and will be prohibited from use or mention in management guides for use under this project. In some cases this will leave only Bacillus thuringiensis (B.T.), diazinon, or malathion, for them to suggest as a control alternative for some pests listed. It is well known that B.T. is most effective at low population levels; therefore, the EA team is very concerned as to what will happen if these pests occur at outbreak population levels and crop destruction is imminent. Use of restricted use but highly effective and safe (with proper training) pesticides could save the crop and the grower's ability to repay the crop production loan if use can be approved under such "emergency" situations, if illegal residues will not result. If an emergency situation occurs, AID/ES may want to make special provisions to use selected restricted use pesticides such as some of the synthetic pyrethroids. However, they must be known to be effective, registered for use on that Crop, and will not threaten aquatic habitats. Guidelines for the development of such a program is outlined below and in Section 2.4.

Since project ATAC personnel need to have extensive training (Chapter III 1.5) in pesticide use and management, it is proposed that this training be made equivalent to that required for the commercial certified applicator license in the U.S. Consideration should then be given by AID/W to allow the use of restricted use pesticides under an emergency situation as that described above where general use pesticides are deemed ineffective and signifiant crop losses will occur if the RU pesticide is not used. At a minimum they should be allowed to use selected RU products under the direct supervision of ATAC personnel.

The MAG/DDA has agreed in principle to collaborate with AID/ES to approve the use of RU pesticides by ATAC personnel and farmer cooperatives in emergency situations. They are willing to work

with the ATAC Project Manager and ATAC P/PM Coordinator in developing this program. Dr. Rolando M. Melara, Director of DDA, indicated he would consider allowing AIFLD/DLDP-ATAC technicians to call on DDA field personnel to make an inspection and certify that an emergency situation did or did not exist. Dr. Melara indicated that an "Official Certificate" could be designed and used. A copy of the completed form would be forwarded to the central office. The EA team suggests that DDA supervisors occasionally make a "surprise" re-inspection to keep the system operating correctly.

The DLDP/ATAC and DDA technicians should collaborate to develop the list of needed RU pesticides which would be needed for approval as soon as possible. This list should then be submitted to AID/ES for submission to AID/W for approval. Consideration for inclusion on the list should be given to the synthetic pyrethroids with lower mammalian toxicity (Table 2b) where aquatic systems are not involved in close proximity.

2.4. Availability and Effectiveness of other Pesticides or Non-chemical Control Methods (i)

Proposed pesticides, as well as others, are available through commercial outlets (Appendix 5) and as contraband in El Salvador. Table 4 lists the insecticides imported and are listed by the decreasing $US value imported. Similar lists arranged alphabetically are given in Appendix 5.

The area planted to each of the major basic grain crops is given in Table 5A for 1986-1990 and shows at least a temporary increase in area. The corresponding decrease in insecticide and increase in herbicide importations (Table 5B.) is due to increases in basic grains and a corresponding decrease in cotton. This is also used to explain the decrease in methyl parathion and increase in methamidophos use (Table 5C).

Crop rotation, use of clean (pest free) planting material, destruction of diseased crop plants, crop residue destruction, biological control, and a host of other cultural practices reduce pest severity. This project will encourage the use of these kinds of nonchemical control methods in its programs.

For example the diamond-back moth, Plutella xylostella (L), is a problem in cabbage. Successes of the Commonwealth Institute of Biological Control (CIBC, Trinidad) and Escuela Agrícola Panamericana (EAP) with releasing the parasite, Apanteles plutella, against diamond-back moth should be noted. This project should establish a strong relationship with CIBC and EAP to attempt to exploit biological control successes (Bottrell,

Table 4. Importations of insecticides by formulated products, arranged by value, 1990.

COMMON NAME	$ US
LAMBDA-CYHALOTHRIN	660,818
CHLORPYRIFOS 2.5G	284,873
PHOXIM**	207,504
OXAMYL	192,814
METHYL PARATHION	162,508
MALATHION*	134,050
TERBUFOS	125,000
CARBOSULFAN	111,750
CHLORFLURAZUM**	103,950
DIAZINON*	100,100
FENTHION	87,514
PERMETHRIN	87,200
DELTAMETHRIN**	86,400
CHLORPYRIFOS 4E	83,939
DDVP	79,160
CHLORPYRIFOS 5 G	73,481
TRUENO**	64,000
BIFENTHRIN	61,500
DISULFOTON	46,500
BACILLUS THURINGIENSIS	39,165
PROFENOFOS	29,000
DIMETHOATE	15,696
ISOFENPHOS	13,400
CYFLUTHRIN	5,725
POLO**	5,000
PROPOXUR	2,650

* GENERAL USE
** NOT REGISTERED IN USA

SOURCE: Data Compiled by Dr. Saul Contreras from MAG/DDA records.

Table 5. Basic grains production and trends in pesticide use in El Salvador, 1980-1990.

TABLE 5.a. Amount of area planted in basic grains from 1987 - 1990 in El Salvador (MANZANAS = Mz; 1 Mz = 0.7 Ha.).

YEAR	CORN	BEANS	RICE	SORGHUM
1986/87	368,100	87,100	17,200	171,500
1987/88	398,500	89,300	16,700	178,700
1988/89	402,800	96,100	19,700	174,200
1989/90	394,750	91,600	22,200	170,900

TABLE 5.b. Importations of pesticides during the period from 1980-1990 IN El Salvador.

YEAR	VALUE OF IMPORTATIONS $ US	% OF TOTAL IMPORTATIONS INSECTICIDES	HERBICIDES	FUNGICIDES
1980	14,947,465	77.31	18.39	3.80
1985	26,286,716	65.05	28.46	6.48
1990	17,124,233	45.32	47.99	6.68

TABLE 5.c. Use of methyl parathion and methamidophos from 1980-1990 IN El Salvador.

YEAR	VALUE OF IMPORTATIONS $ US	% OF TOTAL IMPORTATIONS METHYL PARATHION	METHAMIDOPHOS
1980	14,947,465	19.5	2.9
1985	26,826,716	12.0	10.0
1990	17,124,233	4.0	11.0

SOURCE: Data compiled by Dr. Saul Contreras from MAG/DDA records.

1989). Also the latest data on the use of this parasite in the IPM Project at the Escuela Agrícola Panamericana (EAP) should also be obtained from Dr. Keith Andrews in Honduras. (Dr. Andrews address is EAP, El Zamorano, Apartado Postal 93, Tequcigalpa, Honduras; Phone (504) 33-27-17 or 33-31-73; FAX (504) 32-85-43.) The successful use of Bacillus thuringiensis in the cabbage production areas in ES has previously been cited. This product was also a major component in the IPM programs observed at the three FUSADES/DIVAGRO experimental farms visited by that project's EA team (Vega and Ward 1989).

Further, demonstration plots under the control of this project and the proposed linkages with IPM research projects should result in their being apprised of a variety of alternative, legitimate control tactics aimed at evaluation of cost/benefit of what will emerge as "options" for ultimate farmer user groups. This is a prime methodology for educating farmers to concepts of multiple and alternative tactics.

2.5.El Salvador's Ability to Regulate or Control the Distribution, Storage, Use, and Disposal of the Requested Pesticides (j)

The inappropriate use of pesticides is a classic example of the existence of external costs (externalities in economic jargon). External costs are the detrimental effects arising from pest control action, which affect parties other than the pest control decision-maker, but for which no compensation is paid. Pesticide external costs may be monetary or can be expressed in terms of reduced human health, adverse effects on animals, loss of yield potential, or negative environmental spill-overs. Since these costs do not directly affect the pesticide user, they go unnoticed and do not enter the pesticide use decision making process, leading to potential overuse. Three common approaches are used to reduce these losses. They are:

1. Education - training farmers, manufacturers, business persons, and health personnel of the consequences of their actions.
2. Market intervention - increasing pesticide prices through taxes or other forms of governmental action to force the recognition of the external cost by the user and potentially, provide a method of compensation to the bearers of the external costs.
3. Governmental regulation - prohibition or control of pesticide use and manufacturing through the legal system.

Since the second approach requires valid estimates of the external costs, which are often difficult to obtain, education and/or regulation are commonly implemented by governments to reduce external costs.

El Salvador is no exception. The GOES has recognized the existence of pesticide externalities through the establishment of pesticide control regulations and through its desire for increased training for pesticide users. The Pesticide Control Act of 1973 (Decreto No. 315), and its related regulations (Decreto No. 28, Oct. 15, 1979) provide for the control of the manufacturing, reformulation, storage, importation, sale, use, and certification of applicators of pesticides in El Salvador. Responsibility for its enforcement resides with the Ministry of Agriculture (MAG) through its Department of Plant and Animal Protection (DDA). The present capacity of DDA is inadequate to monitor and enforce the law. The funding of the PRISA project by the World Bank (WB) and Banco Internacional de Desarollo (BID) hopefully will change this situation. Dr. Rolando M. Melara, Director of DDA, indicated part of the project would provide vehicles for his inspectors. Plans are to visit each major distributor of agrichemicals at least four times per year with the help of these funds. Plans are already being made by MAG/DDA to take advantage of the FUSADES/ DIVAGRO/QA Applicator Certification Program by sanctioning their training and certification program. Dr. Melara responded positively to the FUSADES/DIVAGRO/QA proposal in this regard and a copy of the acceptance letter appears in Appendix 7.

This project affords another opportunity to stimulate more active participation of the Ministry of Agriculture in pesticide use monitoring, enforcement, and training. The DDA must be mobilized at least to the extent indicated above if restricted use pesticides are to be used on this project. A legalized training, licencing, and enforcement program must be in place to enforce the certification program. They may also need to be involved in the certification of emergency situations requiring the use of RU pesticides. This possibility will be discussed in a following section. The following activities are suggested to accomplish this increased participation and are as follows.

1. Development of a coordination committee composed of representatives from AIFLD, DIVAGRO, DDA, OIRSA, and FAO to finalize the new Plant and Animal Health Protection Law delegating the necessary authority and providing the infrastructure to enable DDA to randomly sample and analyze shipments of foodstuffs proposed for export or import for pesticide residues. A major goal would be to encourage the enforcement of the pesticide applicator certification law.

2. Initiation of the proposed linkages with institutions with IPM research components, including CENTA, as outlined in chapter four.

3. Development of an education and training program in cooperation with the DIVAGRO/QAP and DDA inspectors located in the regions to improve pesticide safety and sample selection and preparation of samples of crop residue samples and agrichemicals at the producer level.

4. A pesticide residue surveillance program aimed specifically at the ATAC farmers, who provide crop outputs to the agribusiness groups for exportation.

2.6. Ability of AID to Regulate or Control the Distribution, Storage, Use, and Disposal of Pesticides in the Agribusiness Development Project (j)

The AIFLD/DLDP-ATAC project manager or a designated technician should develop and oversee implementation of a plan that includes monitoring of the following:

* Safe use practices of pesticides by project personnel and participating farmers. Special attention will be given to the observation of established thresholds prior to treatment.

* Pesticide efficacy.

* Potential environmental impacts resulting from pesticide use. Special attention will be given to population changes of natural enemies, honey bees, and other selected indicator species in treated areas.

* Potential environmental impacts resulting from the total DLDP activities. Baseline sampling should be conducted before any ATAC tech-pack recommended changes are made and resampled periodically after initiation to measure project caused changes. This should include, at a minimum, 1) Samples to determine possible changes in species diversity of both plants and animals; 2) Pesticide residues in soil and surface and ground water (see minimal sampling scheme in Annex 4); and 3) Worker safety as determined by periodic cholinesterase sampling.

The monitoring program should include periodic sampling of water above and below project areas, residue analyses of edible produce, and cholinesterase sampling of workers subjected to frequent organophosphate and carbamate pesticide exposure.

(Details of the monitoring and environmental sampling program are outlined in Annex 4.) The Pesticide Laboratory in CENTA of the MAG can service these Project needs. The CENTA laboratory has the responsibility for determining the quality of pesticide formulations entering and/or used in the country, and for monitoring pesticide residues in food products, the environment, and for human health effects due to pesticide exposure. For practical reasons, monitoring should be kept to a minimum until the FUSADES/DIVAGRO-QA Laboratory is equipped to assist with the analyses.

In the meantime, an arrangement needs to be worked out between AIFLD/DLDP-ATAC and the CENTA Laboratory for direct payment of services or direct supply of the needed reagents. If payment goes to MAG headquarters, funds are often weeks late in reaching the laboratory, forcing suspension of operations for lack of reagents. The lab should work out a relationship with Mr. Bruce Mann at the University of Miami School of Medicine (Department of Epidemiology and Public Health, Environmental Epidemiology Unit, Chemistry/Toxicology Laboratory, 12500 S.W. 152 nd St., Building D, Miami, FL 33177; Phone 305-284-7328; FAX: 305-284-7325) or another approved pesticide residue lab in the US and duplicate samples occasionally sent for calibration and verification of techniques. Residue analyses at the MAG/CENTA lab currently cost $46.90 (US) each chemical and pesticide quality analyses are $37.50 (US).

The AIFLD Project manager or his designated technician will be responsible for immediately correcting any unsafe practices detected by monitoring.

In regular AID projects careful control can be exerted in the selection, purchase, extension, use, and disposal of pesticides. Particular attention is given to assuring that only general use pesticides are used. This is the case with the agricultural microenterprises since control can be exerted in the purchasing phase. However, unless special measures are taken, only limited control can be assured in situations such as the SF since the farmers are provided with funds by the SF or intermediary credit institutions (ICI's) and the farmers can purchase whatever they want. However, there will be opportunities for control through the technicians providing the technical assistance and recommending safe technical packages. Also, the training programs should stress purchasing the approved pesticides. All too frequently, highly toxic pesticides are used or pesticides which are bio-accumulative and persistent. Many of the chemicals currently purchased (Appendix 5) are either banned or severely restricted for use in the U.S. A number of possible ways of controlling what a farmer purchases have been explored; however, all but one seems, at first glance, unwieldy and unworkable. One method has merit and a version of it should be incorporated into

the project. This is only feasible on the scale indicated for the non-traditional export crops proposed for the project. Random, infrequent (e.g. one-third that of export crops) sampling of basic grains could provide some grower interest and will help bring the activity into compliance with AID Reg. 16. This would result in an a reduction of the problems associated with the exportation and internal consumption of fruit, vegetables, and basic grains with illegal or excessive pesticide residues. However, the residue program will only be required on export crops.

In essence, the following steps are required:

1. Place a condition into the AIFLD/SF grant or AIFLD/DLDP agreement that the SF will agree to withhold future years loans to farmers who use pesticides other than "approved pesticides". To assure compliance, maintain a list of farmers who have failed to comply with this agreement. Enforcement would be subject to an appeals procedure as outlined below.

2. Provide training in safe use of the approved pesticides along with assurances during the training program that the approved pesticides will indeed be effective. Efficacy should be proven in demonstration plots and through the IPM research linkages already discussed.

3. To continue to strengthen the capabilities of MAG, establish an inspectorship to sample farm produce, at random, and without prior notice, on farms of loan recipients, concentrating on farms with export crops, at least initially.

4. Analyze samples in appropriate laboratory and notify the farmer, SF or other loan institution, ATAC technician, and proper enforcement officials of any farmer who is not cooperating, based on the finding of excessive residues or residues of non-approved pesticides. Since no Salvadoran laboratory is currently capable of performing such analyses on a routine basis, the first year's monitoring may have to be conducted in collaborating U.S. laboratories until the lab being constructed by FUSADES/DIVAGRO is completed.

5. All of the above, of course, is based on agreement of the farmers, as a condition of the loan, to have their crops sampled.

In the operation of this monitoring program, an appeals system must be developed to allow affected farmers to obtain the results of a second analysis or show proof of purchase of approved chemicals, evidence of drift or sabotage, or other extenuating

circumstances. The possibility of prior years pesticide should be considered. This has occurred on the CLUSA cooperative projects. Soil samples should be taken and analyzed to confirm or refute this possibility. Consideration could be given to sanctions being enforced during the first two years only after a second offense, especially in the case of drift, residue carryover or sabotage. However, care must be taken to avoid letting illegal or excessive residues enter either domestic or export marketing channels.

The residue testing program and other monitoring programs should be reviewed at each planned project evaluation to determine cost effectiveness in achieving stated goals. However, a special two-year evaluation should be conducted with the involvement of IPM consultants and AID/W to evaluate this as a method of enforcing A.I.D. regulations and mitigating the effects of the proposed emergency use of RU pesticides.

CHAPTER FOUR:

ENVIRONMENTAL CONSEQUENCES AND MITIGATING MEASURES

1.0. POTENTIAL EFFECTS FROM PESTICIDE USE

1.1. Extent to which the Proposed Pesticide Use is Part of an Integrated Pest Management Program (c)

Reliance on pesticides alone is expensive and these rarely give lasting control. Pests often become physiologically or behaviorally resistant to pesticides used extensively. Such resistant pest strains offer serious consequences to both farmers and the general public. Resistance is most likely to occur in areas where sole reliance is placed on pesticides and use is heavy. Control failures and resistance problems have been suspected for several insects, especially in the cotton growing areas of ES. According to Dr. Ranier Daxl, a German (GTZ) technical assistance leader in IPM working with CENTA, whiteflies attacking beans are also resistant in some areas.

Experience worldwide has shown that the best way to avoid pest resistance and also to increase and sustain agricultural production is to employ a variety of control tactics, including biological (predator, parasite, and pathogenic natural enemies of pests), cultural, genetic, physical, and legislative. This multi-tactic, balanced approach is termed integrated pest management (IPM) or "manejo integrado de plagas" (MIP).

Under IPM/MIP, crops are regularly monitored (called "scouting") for presence of pests, natural enemies, and other factors which may influence a decision concerning a control measure. Pesticides are applied only as pest populations have exceeded unacceptable density levels (economic thresholds) and there is reasonable assurance that pesticide use will be profitable and non-disturbing to the environment.

The IPM concept is currently playing a role in Salvadoran agriculture. Multi-tactic approaches can now be found: for example, the cabbage production packages being used include the use of Bacillus thuringiensis product for "worm" control. However, much improvement can be made in monitoring programs and use of economic injury levels and thresholds. This AID project must be revised to stress training and technical assistance to advance IPM concepts and techniques in El Salvador. However, development and implementation of IPM will be a long-term undertaking. During the 3 year duration of this project, one should seek movement toward IPM where pesticides are truly only used on an "as needed" basis. This will require IPM

research on specific crops and pests to provide alternative tactics.

It is AID policy to stress IPM and make every effort to minimize the use of pesticides. The ATAC phase of this project certainly fulfills this requirement for existing or "shelf" IPM technology they plan to extend to producers of non-traditional crops. However, there is no provision made to conduct the research needed to test alternative IPM management strategies on the specific project crops under Salvadoran conditions. Past experience in AID projects shows that this can only be accomplished by budgetary "set-asides" or the creation of special projects, so that within the term of the project there is assurance that needed testing and technical assistance will be accomplished. Short-term technical assistance from plant protection specialists in the US in a collaborative effort with local plant protection scientists is considered to be a key part of this process. Only in this way can there be assurance of completion of successful field trials and studies in the short term and a trained, experienced team to continue IPM research after the project is terminated.

In the case of the AIFLD/DLDP project it is beyond the scope of the project to get heavily involved in IPM research. Therefore, it is recommended that the project staff develop strong linkages with established IPM research groups in the Central American Region. Several such institutions are listed below.

These pest management research activities should focus, at a minimum, on the following:

a) identification of the nature and magnitude of existing pest management problems;

b) assistance in the design and identification of a testing/evaluation program on appropriate pesticide use and efficacy;

c) design of a system of pesticide and alternative technology field trials and evaluation which will include some form of crop insurance for participating farmers;

d) identification, training, and use of appropriate personnel to monitor and evaluate field testing programs;

e) training in the safe use, handling, application, and storage of pesticides; and

f) sensitization of farmers as to the advantages of an integrated pest management program.

These field testing programs should include one or more, as appropriate, studies related to:

a) use of parasites, predators, and biorational pesticides as alternate pest control agents;

b) investigation related to crop loss assessment and establishment of "protocol" treatment threshold recommendations;

c) use of crop varieties which show acceptable levels of resistance to local pests;

d) effectiveness of crop rotations to reduce nematodes, disease, and soil pests;

e) maximized use of mechanical and/or cultural control based on availability of labor inputs; and/or

f) evaluation of the status of pesticide resistance and alternative control measures.

Although the proposed pesticide use is not part of an IPM program, development and testing of IPM systems for a number of crops of interest to the project (e.g., maize, beans, rice, cabbage, tomatoes, bell pepper) has been underway for several years in a number of countries in Central America, including El Salvador. These IPM systems are the result of the efforts of a number of national and international institutions, including the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE); Escuela Agrícola Panamericana (EAP); Agricultural University, Wägeningen, The Netherlands; Gesellschaft für Technische Zusammenarbeit (GTZ); and MAG's Centro Nacional de Tecnología Agropecuaria (CENTA), independently, and in collaboration. IPM guidelines for maize, tomatoes, bell peppers, and cabbage were published in 1990 by the CATIE/EAP Regional IPM project RENARM (Regional Natural Resources Management Project) funded through ROCAP the regional AID office. In addition, pest management recommendation manuals, pest identification leaflets, and related literature for basic food crops, most of which is applicable to agricultural conditions in El Salvador, have been developed during the past few years by the IPM project in Honduras, which is implemented by the EAP. Also, DIVAGRO has published IPM guides for some of the export crops (FUSADES/DIVAGRO 1990a).

Finally, pesticide management and safety guides, bulletins, and training manuals are available from a wide number of sources,

such as the Consortium for International Crop Protection (CICP), Pan American Health Organization (PAHO), CATIE, EAP, the University of California, University of Florida, Universidad Nacional de Costa Rica, DIVAGRO, individual agrichemical companies, and Groupement International Produits Agrochimiques des Associations Nationales de Fabricants de Produits Agrochimiques (GIFAP).

The DLDP should strive to obtain part of the extensive literature on IPM programs and training materials in the area of pesticide management and safety. The literature should then be made available to the technical assistance personnel employed in the DLDP/ATAC. This would be a valuable contribution in the effort to expand and amplify these individual's knowledge and awareness of the risks and hazards associated with pesticide use. Establishing a linkage with the FUSADES/DIVAGRO computer literature capabilities would help satisfy part of these requirements. Furthermore, organization and presentation of seminars, workshops, and field days in pesticide management and crop specific IPM practices to project beneficiaries would strengthen and support the capabilities of these individuals to deal more effectively with crop protection and pesticide matters in the daily performance of their duties.

In order to more efficiently and effectively promote appropriate pesticide use and the adoption of integrated pest management practices in the crops emphasized by the project, a single individual must be made responsible for supervising and coordinating the pesticide and pest control activities conducted by the separate institutions linked to this project. This EA, therefore, recommends that the Project contract a local crop protection specialist, with training in one of the major IPM disciplines (entomology, plant pathology or weed science), and practical experience in pest management research and/or extension, to serve as Pest/Pesticide Management Coordinator for the project. This person will be responsible for: a) backstopping technical personnel in AIFLD, UNOC, UCS, FOES, and AID in pest and pesticide management related matters; b) coordinating and planning IPM and pesticide management training for project personnel with host country [FUSADES/DIVAGRO, CENTA, and Asociación de Proveedores Agrícolas (APA)] and international or regional organizations (CATIE, EAP, GTZ, OIRSA); c) implementing linkages with the aforementioned FUSADES/DIVAGRO computer database; d) designing and implementing, with the assistance of other project personnel, monitoring programs for pest management and pesticide use practices; e) setting up and maintaining a small, practical pest/pesticide management reference library for the project; f) establishing and maintaining professional contacts with individuals and institutions involved in pest/pesticide management activities in El Salvador and other countries; and g) providing overall

leadership and evaluation in IPM matters for the project, including suggestions for strengthening and upgrading project pest/pesticide management efforts.

1.2. Methods of Application and Availability of Appropriate Application and Safety Equipment (d)

If pesticides are used, the project would primarily utilize lever-operated, hydraulic backpack sprayers. Foliar applications would be made primarily with these sprayers. However, granular pesticides would be incorporated in the soil and rat and slug baits would be selectively placed in known rat habitats or in field margins.

The project will require that the financial institutions include funds in the loan for the purchase and use of all appropriate protective devices and clothing if pesticides are included in the loan. The SF and DLDP/ATAC personnel will be required to verify funding for safety equipment upon AID/ES request. The agricultural microenterprise phase will see that this equipment is available for purchase in their businesses. Rubber boots and coveralls or long-sleeved shirts and full-length pants were observed by this EA team as being available in the market-place. However, approved face masks and rubber gloves were not found, but were reported to be available at some establishments in some areas.

The project will provide and enforce the use of all appropriate protective devices and clothing - face masks, gloves, boots, and coveralls - for project personnel who apply pesticides. Agreement must be reached with all project contractees or grantees that the highest safety standards are upheld, and costs for protective devices and clothing must be a part of contract/grant budgets let by this project if pesticide use is proposed. It is the AIFLD/DLDP Project Manager's responsibility to see that pesticides are transported, stored, mixed, applied, and disposed of properly as specified on the pesticide's label and outlined in Annexes 1, 2, and 3. The project manager will see to it that the project follows the principles of safe pesticide management as outlined in "The World Bank Guidelines for Selection and Use of Pesticides". From time to time the Regional Bureau Environmental Officer will provide to the mission current AID/W interpretations of these guidelines. Minimum standards are given in the guidelines in Annexes 1, 2, and 3.

Based on appropriate label statements on the pesticide package, AID/ES will require loan recipients to follow all recommendations on rates and frequency of application, time of application, and the number of days before harvest the pesticide may be applied. Failure to meet label standards will be grounds for the AIFLD/DLDP project manager's cancellation of specific grants,

contracts or loans let by this project. Partial enforcement of these requirements in the ATAC will be accomplished through periodic, random sampling of harvested crops and conducting residue analyses for the most likely pesticides to have been used. However, this will require that a Salvadoran laboratory be available and have the capability to test for the required pesticides. This is being accomplished with the proposed residue analysis laboratory being constructed and equipped by DIVAGRO.

Pesticides should be stored in their original containers in a facility specifically designated for that purpose. The facility should be locked with keys assigned only to authorized personnel. A sign reading "DANGER: PESTICIDE STORAGE AREA" (in spanish) should be posted. Pesticides should never be stored near food, animal feed, animals or drinking water. The storage place should be in an area protected from tropical storms and fire hazards.

Special attention should be given to the pesticide storage facilities. This EA team observed the pesticide storage facilities at three cooperatives. In each case, all classes of pesticides were being stored in the same location as were fertilizers, hand implements, and in two cases with planting seed. Cross-contamination could occur as well as damage to the planting seed by herbicides. Also, in some cases the storage facilities were a part of a larger building where fumes could penetrate to offices, work areas, and sleeping areas. Separate pesticide storage facilities should be constructed and herbicides should be separated from other pesticides and fertilizers.

Empty containers should never be reused - there is no practical method for removing all of the toxic residues. Mr. Peter Gore, Environmental Officer AID/ES, suggested AIFLD/DLDP do the disposal. A refundable deposit on the containers can be required and when they are returned, proper disposal can be accomplished.

Liquid containers should be treated as follows: empty the container's content into the spray tank, drain in a vertical position for 30 seconds. Refill the container 1/4 full, rinse and pour into the tank, drain. Repeat rinsing and draining three times. Use the rinse water in the sprayer. Punch several large holes in the container's bottom. Bury the container in a designated land disposal site on high ground away from water.

Containers and small quantities of leftover pesticides should be buried in pits in the soil about 1/2 meter deep. Bottoms and sides of the pits should be lined with lime, carbon, charcoal, or organic matter such as leaves, straw or other plant debris. Any of these materials is a good absorbent and facilitates breakdown of the chemical. The pits should be refilled and mounded above ground level with soil. Empty paper containers and bags also

should be buried in similar burial pits. The project will initiate an intensive training program in pesticide safety and management for project personnel, collaborators, and loan recipients as outlined in Annexes 1, 2, and 3.

1.3. Acute and Long Term Toxicological Hazards, either Human or Environmental, Associated with the use of Pesticides and Measures Available to Minimize Such Hazards (e)

None of the pesticides in Table 2, if used properly, pose a significantly high risk to applicators, farmers, or the general population. However, all pesticides are potentially hazardous to humans and the environment and should be treated with caution regardless of their relative toxicity. The potential health hazard depends on the toxicity and the amounts swallowed, absorbed or inhaled. The relative toxicity of a pesticide can be found by examining its LD_{50} value which is the amount of the chemical necessary to kill 50% of the test animal population (usually laboratory rats). It is expressed in the weight of pesticide per unit weight of body (mg/kg) when swallowed (oral toxicity), absorbed through the skin (dermal toxicity) or inhaled. The latter value, inhalation toxicity, is usually expressed in parts per million (ppm) per unit volume of air.

Pesticides with the lowest LD_{50} value are potentially the most toxic to humans. Ingestion of just a few drops to a teaspoon of a pesticide with an oral LD_{50} value of less than 50 might be sufficient to kill an adult person. An adult would probably have to consume 16 tablespoons to 1/2 kilogram or more of a pesticide with an oral LD_{50} of 5,000 before dying. However, the pesticide's formulation, percentage active ingredient, and other factors determine its actual hazard level. Rodenticides (rat poisons), for example, have low oral toxicity values but would be considered only moderately hazardous to humans because their pellet formulations contain only about 2% active ingredients.

Acute oral and dermal LD_{50} values of most of the proposed pesticides are shown in Table 6. Acute toxicity results from a severe case of poisoning due to a single dose of exposure to the pesticide.

Tables 1, and 6 show EPA's "signal word" for selected pesticides. These words have been assigned by levels of toxicity and appear on the labels of EPA registered pesticides. Table 7 gives criteria for signal word designation by EPA and equivalent categories used by MAG/DDA. Pesticides assigned the signal word "DANGER" are highly toxic compounds and are not recommended by EPA for general use. Materials showing the words "WARNING" or "POISON" also present a high potential hazard to the user. Some of the possible effects on humans are discussed below.

Table 6. Toxicity and EPA signal word for selected pesticides.

Common name and (brand name)	Activity[1]	Acute LD_{50} mg/kg Oral	Acute LD_{50} mg/kg Dermal	EPA Signal Word[2]
Acephate (ORTHENE)	I	945	>10,250	CAUTION
Aldicarb (TEMIK)	I,N	0.9	>5	DANGER
Ametryn (GESAPAX, EVIK)	H	300-400	>10,200	CAUTION
Anilazine (DYRENE)	F	> 5,000	> 5,000	DANGER
Benomyl (BENLATE)	F	>10,000	>10,000	CAUTION
Bensulide (PREFAR)	H	271-1,470	-	CAUTION
Biphenyl (DIPHENYL)	F	3,280	-	-
Bitertanol (BAYCOR)	F	>5,000	>5,000	WARNING CAUTION
Bt (DIPEL)	I	-	-	CAUTION
Bupirimate (NIMROD)	F	>4,000	-	CAUTION
Captan (CAPTAN)	F	9,000	-	CAUTION
Carbaryl (SEVIN)	I	850	-	CAUTION
Captafol (DIFOLATAN)	F	5,000-6,200	-	WARNING
Carbendazim (BAVISTIN, DEROSAL)	F	>15,000	>2,000	CAUTION
Carbofuran (CURATURR, FURADAN)	I,N	11	10,200	WARNING/ DANGER[3]
Carbosulfan (ADVANTAGE, MARSHALL, POSSE)	I	209	>2,000	WARNING/ DANGER
Chloramben (AMIBEN)	H	5,620	-	CAUTION
Chlorothalonil (BRAVO) CLORTOSIP, DACONIL)	F	>10,000	>10,000	DANGER/ WARNING
Chlorpyrifos (LORSBAN, AGROMIL)	I	96-270	2,000	WARNING CAUTION
Copper hydroxide (KOCIDE)	F	1,000	-	CAUTION
Copper oxychloride (CUPRAVIT)	F	1,000	-	-
Coumatetralyl (RACUMIN)	R	-	-	-
Daconate (DCPA)	H	10,000	>10,000	CAUTION
Dalapon (DALAPON, REVENGE)	H	970	7,570	WARNING
DCNA (BOTEC, BOTRAN)	F	>5,000	-	CAUTION
Deltamethrin (DECIS)	I	128 >5,000	>2,000	-
Demeton Methyl (METASYSTOX)	I,F	170-300	260-410	WARNING
Diazinon (BASUDIN)	I,F	300-400	3,600	CAUTION
Dibromochloropropane (NEMAGON)	I,N	170-300	260-410	WARNING[4]
Dicofol (KELTHANE)	A,I	684-809	2,100	CAUTION[4]
Dienochlor (PENTAC)	A	3,160	3,160	WARNING
Dimethoate (ROGOR, CYGON)	A,I	215	>1,000	WARNING
Dinocap (KARATHANE)	A,F	980	-	CAUTION
Diuron (KARMEX, DYNEX)	H	3,400	5,000	WARNING

Note: See page 3 of 3 for footnotes.

Table 6. Toxicity and EPA signal word for selected pesticides. (Cont'd).

Common name and (brand name)	Activity[1]	Acute LD_{50} mg/kg Oral	Dermal	EPA Signal Word[2]
Endosulfan (THIODAN)	I,A	22.7-100	359->500	DANGER
Ethoprop (MOCAP)	I,N	61.5	2.4	WARNING/ DANGER
Fenamiphos (NEMACUR)	N	5	80-200	DANGER
Fenoxaprop-ethyl (ACCLAIM, FURORE)	H	2,357	>2,000	WARNING
Fenthion (FENTHION)	I	255-298	1,680-2,830	-
Fluazifop-butyl (FUSILADE)	H	1,490-3,328	>2,420	CAUTION/ WARNING
Fluometuron (COTORAN, METURON)	H	8,900	>10,000	WARNING
Fosethyl-Al (ALIETTE)	F	4,600	>2,000	DANGER
Glyphosate (ROUNDUP, LATIGO)	H	4,300-4,900	-	CAUTION
Hexazinone (VELPAR)	H	1,690	5,278	WARNING/ DANGER
Iprodione (ROVRAL)	F	>10,000	>5,000	CAUTION
Isozophos (BRANCE, MIRAL, TRIUMPH)	I	40-60	118->3100	WARNING
Malathion (MALATHION)	I	1,000-1,375	4,100	CAUTION
Mancozeb (DITHANE F-45, MANZATE 200, MANCOZIN)	F	11,200	>15,000	CAUTION
Maneb (MANEB, MANEX)	F	7,990	-	CAUTION
MCPB (TOPOTOX, THISTROL)	H	680	-	CAUTION
Mephosfolan (CYTROLANE)	I	8.9	28.7	DANGER
Metalaxyl (RIDOMIL)	H	669	>3,100	D/WARNING
Metaldehyde (METALDEHYDE)	M	250-1,000	630	CAUTION/ WARNING
Methamidophos (MONITOR, MTD, TAMARON)	I	20	118-130	DANGER
Methomyl (LANNATE)	I	17-24	5,880	DANGER
Methyl parathion (BELLOTION, FOLIDOL, FOLIPOLVO, FORITHION, PARATION METELICO, QUIMATION)	I	50-62	491	DANGER
Mevinphos (PHOSDRIN)	I	4.15	57	DANGER
Monocrotophos (AZODRIN)	I	8-23	354	DANGER[4]
Oxamyl (VYDATE)	I,N	37	2,960	DANGER
Oxycarboxin (PLANTVAX)	F	2,000	>16,000	CAUTION
Oxyflurofen (GOAL, KOLTAR)	H	>5,000	>10,000	WARNING
Oxythioquinox (JOUST, MORESTAN)	I,A,F	1,500	>2,000	CAUTION

Note: See page 3 of 3 for footnotes.

Table 6. Toxicity and EPA signal word for selected pesticides. (Cont'd).

Common name and (brand name)	Activity[1]	Acute LD_{50} mg/kg Oral	Dermal	EPA Signal Word[2]
Paraquat (GRAMOXONE)	H	150	-	DANGER
Pendimethalin (PROWL)	H	2,679	2,260	WARNING
Phorate (THIMET, RAMPART)	I	2-4	20-30	DANGER
Phosphamidon (DIMECRON, SWAT)[4]	I	17-30	267	DANGER
Phoxim (BAYTHION, VOLATION)	I	2,000	>5,000	NOT REG.
Propargite (OMITE, COMITE, FENPROPAR)	A	2,200	-	DANGER
Propineb (ANTRACOL)	F	5,000	>5,000	-
Propoxur (BAYGON, PRENTOX, UNDEN)	I	50-104	>5,000	CAUTION/ WARNING/ DANGER
Prothiophos (TOKUTION, TOKUTHION)	I	1,500	>5,000	NOT REG.
Sethoxydim (POAST)	H	3,200	>5,000	CAUTION
Spreader-Sticker (TRITON)		-	-	WARNING/ DANGER
Terbufos (COUNTER, TERBUGRAN)	I,N	3.5-9.2	1.1	DANGER
Thiabendazole (MERTECT,TECTO)	F	3,100	-	CAUTION
Thiophanate (CARCOBEN, TOPSIN-E)	F	>15,000	-	(CANCELLED)
Thiram (THIRAM)	F	780	-	CAUTION
Triadimefon (BAYLETON)	F	1020-1855	>5,000	WARNING CAUTION
Trichlorfon (DIPTEREX)	I	150-400	>500	WARNING
Triflurilin (TREFLAN, SINFLUORAN)	H	>10,000	3,700	WARNING CAUTION
Triforine (FUNGINEX)	F	>16,000	>10,000	DANGER/ CAUTION
Vinclozolin (ORNALIN, RONILAN)	F	>10,000	>2,000	CAUTION
Warfarin (WARFARIN)	R	3	-	WARNING/ CAUTION
Zineb (ZINEB)	F	5,200	>2,500	-

[1] Activity: A=acaricide, F=fungicide, H=herbicide, I=insecticide, M=molluscicide, N=nematicide, R=rodenticide.

[2] See Table 7 for explanation. More than one signal word indicates a difference in formulation (dry vs. liquid) or percentage active ingredient.

[3] WARNING = granules
DANGER = liquid (liquid formulations cannot be used in the project).

[4] All uses cancelled by EPA.

[5] A dash (-) indicates data are not available.

Table 7. Criteria used to establish pesticide toxicity categories (EPA signal words appear below category numbers).

Hazard Indicators	Toxicity Categories I[1] "DANGER"	II "WARNING"	III "CAUTION"	IV "CAUTION"
Oral LD_{50} (mg/kg)	50 or less	50-500	500-5,000	>5,000
Inhalation LD_{50} (mg/liter)	0.2 or less	0.2-2	2.0-20	>20
Dermal LD_{50} (mg/kg)	200 or less	201-2,000	2,001-20,000	>20,000
Eye Effects	Corrosive; corneal opacity not reversible within 7 days	Corneal opacity reversible within 7 days; irritation persisting for 7 days	No corneal opacity; irritation reversible within 7 days	No irritation
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hrs.
EPA Signal Word	"DANGER"	"WARNING"	"CAUTION"	"CAUTION"
Spanish Signal Word	"PELIGRO"	"CUIDADO"	"PRE-CAUCION"	"PRE-CACTION"
MAG/DDA Label Color	Red-Yellow	Blue	Green	Green

[1] The word "POISON" and also a picture of a skull and crossbones appear on the labels of EPA registered in Category I. The MAG/DDA had designated an "extremely toxic" (Extremedamente Toxico) Category that has one-tenth the values listed for EPA Category I (Appendix 5).

Table 8. Example pesticides according to categories.

ORGANOPHOSPHATES
Acephate, Azinphosmethyl, Bensulide, Chlorpyrifos, Demeton-methyl, Dichlorvos, Dicrotophos, Disulfoton, Diazinon, Dimethoate, Ethoprop, Fenamiphos, Fenitrothion, Fenthion, Formothion, Glyphosate, Isazophos, Malathion, Mephosfolan, Methamidophos, Methidathion, Methyl Parathion, Monocrotophos, Oxydemeton-methyl, Oxydemeton-S, Parathion, Phorate, Phosalone, Phoxim, Profenofos, Propoxur, Prothiophos, Terbufos, Triazophos, Trichlorfon, and Vamidothion.

CARBAMATES
Aldicarb, Benomyl, Carbaryl, Carbendazim, Carbofuran, Carbosulfan, Hexythiazole, Methomyl, and Oxamyl.

BISDITHIOCARBAMATES
Mancozeb, Maneb, Propineb, Thiram, Zineb, and Ziram.

ORGANOCHLORINES
Captafol, Captan, Chloramben, Chlorothalonil, Dicofol, Dienochlor, Endosulfan, Oxyfluorfen, Propanil, and Toxaphene.

PYRETHROIDS
Alpha-cypermethrin, Bifenthrin, Cyfluthrin, Cyhalothrin, Cypermethrin, Deltamethrin, Esfenvalerate, Fenpropathrin, Fenvalerate, Flucythrinate, and Permethrin.

TRIAZINES
Anilazine, Atrazine, Hexazinone, Metribuzin, and Terbutryn.

SUBSTITUTED UREAS
Diuron, Fluometuron, and Linuron.

PHENOXY
2,4-D, Oxyflurofen, Quizalofop-ethyl.

MISCELLANEOUS
Bentazon, Biphenyl, Bitertanol, Bromacil, Bupirimate, Dalapon, DCNA, Diquat, Fentin Acetate, Glufosinate-ammonium, Iprodione, Linuron, Metalaxyl, Metsulfuron-methyl, Molinate, Oxadiazon, Oxythioquinox, Paraquat, Pendimethalin, Propargite, Tetradifon, Thiabendazol, and Triadimefon.

NATURAL ORGANIC	BIOTIC
Pyrethrum and Rotenone.	*Bacillus thuringiensis* and streptomyacin.

INORGANIC
Copper hydroxide, Copper oxychloride, Copper resinate, Copper sulfate, and Sulfur.

Possible Human Effects

Organophosphates and carbamates (see Table 8) are cholinesterase inhibitors causing symptomology of varying severity from illness to death by paralysis depending on the dose (concentration) and exposure time. The LD_{50} is an indicator of human sensitivity (extrapolated from animal studies) to a particular pesticide. The mixer/loader/applicator group and laboratory workers handling technical grade pesticides have the greatest risk of exposure and therefore have the greatest risk of intoxication. Treatment is possible with atropine and, in the case of organophosphates, 2-PAM, and the effect is reversible if treated in time. No known long term effects are noted with the organophosphates available in ES, with the exception of chlorpyrifos which is lipophilic and can be stored in body fat. Leptophos and mephosfolan were not listed as registered for use, and none was observed to be available. Leptophos is more lipophilic than DDT and is known to cause delayed neurotoxic effects and demyelinization. Mephosfolan has been shown to cause demyelinization (removal of myelial nerve sheath) and permanent paralysis in chickens.

Carbamate exposure can be treated with atropine (2-PAM is contra-indicated). Bisdithiocarbamate metabolites include ethylene dithio-urea (EDTU) which is a carcinogen. There is very little evidence of EDTU being found under actual field conditions.

If labeling instructions are followed for the use of these types of pesticides, there should not be any long term effects associated with organophosphate or carbamate residues on food excluding the noted exception. Organochlorinated pesticides are lipophilic and are stored in body fat. Since they are carcinogens, exposure should be minimized. Studies should continue to be conducted to determine the half-life of available pesticides as used on selected crops. Dicofol contained DDE, DDD, and DDT as impurities in the past, but current products on the market contain only minute amounts of these contaminants. Use of this product led to residues of DDT and its metabolites in the past.

Use of the esters of chlorophenoxy acids instead of the salts is more dangerous because of respiratory exposure even though the oral LD_{50} of both are approximately the same. The salts are systemic, therefore, there is a chance of residues within the food crop. Chlorophenoxy acids and organochlorines are central nervous system stimulators.

Pyrethroids have low mammalian toxicity (Table 9.) and do not pose an acute poisoning threat to applicators. Residues may build up in human tissue, but little is known of long term

Table 9. Toxicitiy and environmental hazard data for selected synthetic pyrethroid insecticides.

Common Name and (Brand Name)	Acute LD_{50} [1] Oral	Dermal	EPA[2] Hazard Category	Fish Toxicity Category	Fish Toxicity LD_{50} [3]	Bee Hazard
Alpha-Cypermethrin	79	>2000	II	Toxic	---	---
Bifenthrin (CAPTURE, TALSTAR)	375	>2000	II	Toxic	0.15	---
Cyfluthrin (BAYTHROID)	900	>5000	II	---	---	---
Cyhalothrin (KARATE)	3950[4]	---	---	Toxic	0.24	---
Cypermethrin (AMMO, ARRIVO, CYMBUSH)	250	>2000	II	Toxic	2.0-2.8	Toxic
Deltamethrin (DECIS)	129	>2000	---	Toxic	---	Toxic
Esfenvalerate (ASANA)	458	>2000	II	H.Toxic	---	---
Fenpropathrin (HERALD)	2357	>2000	III	H.Toxic	---	---
Fenvalerate (BELMARK, PYDRIN)	451	>5000	II	H.Toxic	0.42	---
Fluvalinate (MAVRIK, SPUR)	261	>20,000	II	Toxic	---	---
Flucythrinate (PAYOFF, CYBOLT)	67	>1000	I	---	---	---
Permethrin (AMBUSH, POUNCE)	430	>2000	II-III	H.Toxic	---	Toxic
Pyrethrum (NATURAL EXTRACT)	1500	>1800	III	Toxic	---	Toxic

[1] Lowest LD_{50} values given, in some cases a range is provided in reference.
[2] See Table 7 for explanation.
[3] Fish LD_{50} (parts per billion - ppb) based on rainbow trout in most cases.
[4] Based on mallard duck, mammal data not available. Source: 1991 Farm Chemicals Handbook.

effects. Pyrethroids are primary irritants and can cause dermal problems for applicators.

The proposed pesticides are generally non-persistent and, if used in accordance with their labels, should present no unusual hazards to the natural environment (see Section 1.4). The project will share with the Plant Protection (DDA) and Agromedical Personnel (DOH) information concerning toxicity of pesticides and procedures for mitigating hazards. Some of the possible environmental hazards are discussed below.

Possible Environmental Effects

Organophosphates, carbamates, and synthetic pyrethroids are less persistent than the organochlorines and, therefore, pose less of a danger to the environment. The triazines and miscellaneous pesticides generally are the most water soluble. Usually, the higher the water solubility, the lower the soil sorption. The higher the water solubility, the greater the threat to water systems. As the soil sorption coefficient increases, the stronger the chemical is held in the soil, which lessens the chance of contaminating water systems. Table 10 is a list of water solubilities and sorption coefficients of selected pesticides.

One of the other possible non-target effects is the hazard of pesticides to honeybees. The relative danger of selected pesticides is as follows:

BEE TOXICITIES

HIGHLY TOXIC - carbaryl, carbofuran, chlorpirifos, diazinon, dimethoate, malathion, permethrin
MODERATELY TOXIC - disulfoton, methomyl, synthetic pyrethroids
RELATIVELY NON-TOXIC - trichlorfon

Caution should be exercised in using any of the highly toxic products in areas where bees are active. Late afternoon applications can help reduce these effects.

Beef cattle are raised mainly in areas where pesticide use is not concentrated. Cotton is grown in several areas. If chlorinated pesticides are or have been used on cotton, and cattle are allowed to feed on cotton stalks and on the cotton seed cake left after cottonseed oil extraction, beef cattle will bioaccumulate the organochlorines in their fat. This can lead to residue levels which exceed the tolerances of importing countries and impose an economic burden on El Salvador as well as a health hazard.

Table 10. Water solubility and sorption coefficients of selected pesticides.

Pesticide Common Name	Trade Name(s)*	Water Solubility ppm @ °C		Sorption Coefficient K_{oc}**
Oxamyl	Vydate, Vydate L, DA-2214	280,000	@ 25	6
Aldicarb	Temik, Temik 15G, OMS771	9,000	@ 30	10
Dicamba	Banvel D, Banex, Dianat, Weedmaster	4,500	@ 25	11
Picloram	Tordon, Amdon, Grazon	420	@ 25	26
Carbofuran	Furadan, Yaltox, Curaterr	700	@ 25	29
2,4,D	Agrotect, Amidox, Weed-B-Gone, Weedtrol	900	@ 25	32
Terbacil	Sinbar	710	@ 25	46
Fonofos	Dyfonate, N-2790	13	@ 21	68
Bromacil	Hyvar XL, Borocil, Ureabor	815	@ 25	72
Simazine	Aquazine, Princep, Simadex Sim-Trol	3.5	@ 20	158
Atrazine	AAtrex, Griffex, Atranex, Vectal SC	33	@ 25	163
Carbaryl	Sevin, Denapon, Tercyl, Septene	40	@ 25	229
Diuron	Karmex, Urox D, Direx 4L, Diurol	42	@ 25	389
Lindane	Gamma BHC, Isotox, Lintox, Silvanol	7.3	@ 25	1,081
Malathion	Mercaptothion, Calmathion, Carbofos, Cythion	145	@ 25	1,778
Glyphosate***	Roundup	12,000	@ 26	2,640
Methyl Parathion	Metafos, Parathion-Methyl, Devithion, Nitrox 80	55-60	@ 25	7,079
Parathion	Thiophos, Bladan, Orthophos, Fanthion	24	@ 25	7,079
Paraquat***	Ortho paraquat CL, Dexuron,	1,000,000	@ 25	15,423
DDT	Tech DDT, Zerdane, Anofex, Gentox	<0.01	@ 25	243,000

* Trade names given for convenience and does not represent endorsement.

** The larger the K_{oc}, the more strongly the pesticide is held in the soil organic matter and the less likely it will leach through soil.

*** Note: These pesticides are ionic and are exception to the inverse solubility to K_{oc} relationship.

Similar dangers are present for the expansion of the vegetable and aquaculture enterprises. Extreme care must be taken to select these sites with both current and past pesticide use history in mind. Residues present in the soil from pesticides used up to 25 years ago are possible if organochlorines were involved. CLUSA cooperatives have already experienced these problems.

Vega and Ward (1989) indicated that animal feed development was being considered at the Del Tropic processing plant by using otherwise discarded material such as peelings and culled fruits and vegetables. Pesticide residue levels should be determined to prevent animal contamination. In Hawaii, an animal feed was developed from pineapple stock without consideration of residues of heptachlor which is used on pineapple. This led to contamination of milk (heptachlor epoxide) from cows fed this material.

As noted earlier, EPA is making or has made a Special Review of four of the proposed pesticides. Captan has been accused of causing tumors and toxic effects on the liver and kidney. Carbofuran granular formulations have been under review for effects on avian populations and many uses have been voluntarily withdrawn. Mancozeb and maneb are also under special review. The Selected or Special Review process is a continuing activity, and the EPA will not take final action on these pesticides until this process and re-registration is completed. Ultimately, the only valid source for information concerning legal use of EPA registered pesticides is the pesticide label. The label should always be followed carefully, as this best assures minimum hazards to users and the environment.

In those cases where it would be desireable to use pesticides on crops where no U.S. or international tolerances have been established, residue sampling will have to be undertaken according to established FAO/WHO Codex procedures and arrangements for analysis and submission of data to the FAO Joint Meeting on Pesticide will have to be made. AID/ST/AGR/AP can provide assistance with sampling protocols, needed steps to obtain FAO/WHO review, and arrange for needed collaboration with pesticide manufacturers. Ultimately, this process should lead to the establishment of Salvadoran tolerances. Such procedures will be imperative for export crops destined for foreign markets and for assuring the safety of products for internal consumption. The US Department of Agriculture (USDA) regional IR-4 project should be consulted for methodology in satisfying these needs.

It is impossible to predict exactly what effects can result from long-term exposures to any pesticide. The most common form of exposure occurs during the operations of mixing, loading, and applying of pesticides and when entering or working in treated

areas soon after application. During mixing and loading, concentrated chemicals are being handled, which increases the hazard. If proper protective clothing is worn and safety equipment used, the amount of exposure will be greatly reduced. The pesticide's label provides safety and emergency guidelines and therefore must be followed closely. The proposed pesticides are generally nonpersistent. Correct use, as indicated on their labels, should greatly reduce significant long-term environmental hazards.

Other hazards, such as accidental spills, usually associated with mixing and loading areas, if not dealt with quickly and adequately, can have localized but severe environmental impacts. Spraying against the wind can result in intoxication of the applicator. Water runoff resulting from heavy rainfall can transport pesticides and/or their metabolites to distant places located downstream. This can result in the contamination of distant water bodies, such as reservoirs, lagoons, ponds, and estuaries.

Excessive insecticide use is to be discouraged in this project since high pesticide use will inevitably reduce or eliminate beneficial arthropod populations, such as pollinators and natural enemies of insect pests. A reduction in natural enemy populations is an important factor in the subsequent rapid pest population buildup and even secondary pest population outbreaks after the suppresive effect of the pesticide dissipates. The buildup of pesticide resistance in target and non-target pest populations is another potential adverse effect of the overuse of pesticides. In El Salvador, a number of agricultural insect pests are suspected of having developed resistance to one or more insecticides since they are no longer easily controlled by those chemicals. Examples of these pests include the sweet potato whitefly, Bemisia tabaci (Gennadius); the diamondback moth, Plutella xylostella (L.); leafminers, Liriomyza spp.; and various species of white grubs, Phyllophaga spp. A well-documented example of a non-target pest developing resistance against practically all major insecticide groups in cotton growing areas of Central America is the mosquito vector of malaria, Anopheles albimanus Wiedemann. The President of one of the cooperatives visited by this EA team indicated they were having to triple the usual rate of one of the synthetic pyrethroids they were using in tick control on cattle.

The proposed pesticides are generally non-persistent and, if used in accordance with their labels, are not believed to cause significant long-term environmental hazards. The AIFLD project can help to reduce the risks associated with pesticide use by actively encouraging and promoting the adoption of safe and appropriate pesticide use practices in project implementation sites. Beneficiary farmers should be encouraged to apply

chemicals only when necessary and on the basis of pest management guidelines provided by the project. The promoters and technical advisors of the project should have sufficient training in pest/pesticide management to enable them to assist farmers to follow user instructions and safety recommendations specified on the manufacturer's label.

1.4. Compatibility of the Proposed Pesticides with the Target and Non-Target Ecosystems (g)

The proposed pesticides are generally non-persistent and, if used correctly and according to their labels, should present no unusual hazards to the target or natural ecosystem. Applying higher dosages, shrinking intervals between applications, spraying during windy conditions, storing or disposing carelessly or rinsing equipment and/or containers in rivers would have harmful effects.

Most suggested insecticides are toxic to some natural enemies and bees, especially if applied at high rates. Thus, natural enemies and bees residing in treated fields and experimental, demonstration or insecticide treated plots would likely decrease. Further, the threat of buildup of genetically resistant strains of insect pests, plant diseases, weeds, nematodes, and rats always exists.

Some of these possible effects were discussed in more detail in previous sections. A list of the endangered species known in ES in 1985 are included in Appendix 4. The EA team suggests that accurate distribution data be included in future studies to facilitate the possible implementation of the finalized Endangered Species Act if required by AID on this project.

Some of these problems are unavoidable when pesticides are used. Minimal adverse effects result only when pesticides are used in combination with other control tactics in an IPM program and when users are educated to the hazards and proper use of the materials. In cases where pest control is necessary, the project will emphasize IPM and pesticide management and, through special training on these subjects, foster a more rational use of the materials.

The project will concentrate in areas already under agricultural production. However, if pesticides are used near national preserves, set-aside lands, ecologically sensitive areas, or areas designated as critical habitat for endangered species, the AID Project Manager should make sure the project complies with requirements of Section 119 of the Foreign Assistance Act. Section 119 ensures that proposed actions by AID will be reviewed so that they do not endanger wildlife species or their critical

habitats, harm protected areas, or have adverse impacts on biological diversity. The Project Manager should work with the AID/ES Environmental Officer to identify any species or critical habitats that may be threatened by the proposed pesticide use and take steps to ensure against the use.

1.5. Provisions Made for Training of Users and Applicators of Pesticides (k)

Training in IPM and pesticide management for pesticide users is an appropriate response to the existence of external costs. Since some of the commodities stemming from the ATAC component of this project are for export or to replace imports, producers must be trained in the appropriate use of pesticides, to establish and maintain commodity markets. A special short course on pesticide management must be funded by the project. Its purpose is to train trainers, who will in turn train agricultural producers (Annexes 1 and 2). The short course will be designed to satisfy certification requirements by MAG/DDA. The suggested minimum duration and topics to be covered in the course are detailed in the following table. The course developed by FUSADES/DIVAGRO-QA program as recommended by Vega and Ward (1989), largely follows these recommendations and have been approved by DDA as satisfying their certification requirements (Appendix 7). Participants successfully completing the course are provided with identification cards certifying to their training (Appendix 7). These cards will need to be modified to show MAG/DDA approval. The AIFLD/ATAC project should consider using this course which will only cost about $40 per participant for tuition.

Having completed the course, the trainees, all of whom will be DLDP/ATAC personnel, will train extension agents, and farmers using the materials provided and following the format of the certified course. They also will serve as a source of technical knowledge for their respective communities where the ATAC is operating. From this nucleus, pesticide training can be spread throughout the country. CLUSA, APA, ENA (FEPADE), and extension service personnel have already contacted DIVAGRO personnel for assistance in developing their own training and/or investigative programs.

Annual updates of project personnel should be planned. The assistance available through Dr. Joseph Saunders of the ROCAP/CATIE-EAP/MIP Project as well as DIVAGRO and CLUSA-MIP programs should be utilized in this effort. The session could include a review of their latest findings from the new ROCAP-RENARM Project. A more detailed training program is included in Annexes 1,2, and 3, but a sample, minimum program would include the following (the FUSADES/DIVAGRO course takes 4-5 days to complete):

PEST/PESTICIDE MANAGEMENT SHORT COURSE SAMPLE TOPICS

TOPIC	MINIMUM HOURS
The Pesticide Problem on a World Scale and in El Salvador.	0.5
Agroecosystem Concepts	1.0
Integrated Pest Management (IPM) Concepts	1.5
Pesticide Toxicology: Emphasis on Locally Used Pesticides	1.0
Pesticide Formulation	0.5
Elements of Chemical Control	1.0
Pesticide Poisoning and First AID	1.0
Worker Protection	1.0
Pesticide Labels	1.0
Precautions in Preparing and Spraying Pesticides	1.0
Disposal of Excess Pesticides and Pesticide Containers	1.0
Pesticide Spill Cleanup	1.0
Pesticide Storage-Emphasis on "Planned Purchases" to Reduce Carry Over of Products.	1.0
Pesticide Application Equipment	1.0
Calculation of Pesticide Dosage	0.5
Calibration of Application Equipment; Field Calibration Exercise	8.0
Factors Affecting Foliar Applied Pesticides	1.0
Factors Affecting Soil Applied Pesticides	1.0
(Minimum) T O T A L	24.0

1.6. Provisions Made for Monitoring the Use and Effectiveness of the Pesticides (1)

As envisioned in this project, loans will be made to producers through SF, banks, ICI's, and agribusinesses who give loans to farmers or employ outgrowers. A problem immediately arises concerning the enforcement of AID's Environmental Regulation 16. A complicated system could be developed to follow the flow of funds and to monitor the use of the loans. Such a system would be expensive to administer. A more efficient approach may be to monitor pesticide residues on the agricultural commodity. A workable scheme is discussed in Section 1.7 and Annex 4 and constitutes a mandatory requirement of the Environmental Assessment for export crops. The residue program is voluntary for the basic grains crops. AID/ES should develop a monitoring and penalty program for these lending institutions and require them to maintain records of compliance.

Vega and Ward (1989) noted that it was improbable that governmental subsidies for pesticides in El Salvador could continue under the new administration. This is in sharp contrast to many countries in Latin American where typical rates of subsidy run as high as 15-25 percent. A selected comparison of US vs. Salvadoran prices for pesticides suggests the prices are higher in El Salvador than in the US with the exception of those reformulated in El Salvador (Appendix 8) or those that are restricted in the US.

Since the market price is generally higher, there is no economic or governmental incentive for "overuse". Misuse caused by insufficient training and consideration of the "spill-overs" may continue. Misuse of this type can be partially resolved through education and training. Training was treated in Section IV.1.5 of this report. Section 1.7 below outlines the major method whereby small farmer compliance will be enforced in export crops.

Vega and Ward (1989) and this review team also evaluated the availability of small quantities of pesticides in small containers as a control method. Small containers might reduce inappropriate use by simplifying required instructions, or by reducing the possibility of excess product. For example, the container could be the appropriate amount for a designated area or for a specified volume of water. Packaging pesticides in small containers may increase their cost, however, by as much as 20 percent. (This number is supported by a review of existing pesticide price differentials in El Salvador, see Appendix 8). The availability of small packages for the commonly used pesticides does appear to be a problem. Herbicides were commonly found on the retail market in sizes of 1 lb. and/or 1 liter; while insecticide package sizes of 250 cc were only available for many insecticides if the distributor repackaged the product.

This leads to inadequately labeled product. This was discussed with Project and APA personnel (Vega and Ward 1989), but no long-term solution was found. Thus, the actual status of availability of adequately sized containers of various pesticides should be evaluated during the first year of the project and viable solutions sought. This situation may be a major advantage to the project, since, having their own agrichemical stores, they can insist on appropriate package sizes from manufacturers and/or wholesalers from which they purchase pesticides.

1.7. Requirements for a Monitoring Program to Implement Control over Pesticide Loans to Farmers (j)

Number of Samples

Considering the number of farmers involved, a small number of samples (eg.5-10) may be insufficient and 100 samples would be excessive due to costs. Twenty-five (25) samples per year (keeping duplicate samples) from randomly selected farmers would represent a reasonable effort and would be adequate to demonstrate the degree of farmer compliance in export crops. More samples would be needed if basic grains are included.

Method of Analysis

Until FUSADES/DIVAGRO-QAP laboratory's capability for analysis can be developed, samples could be shipped to the MAG laboratory or to a commercial laboratory in the U.S. whose credentials are recognized by the LAC/AG Bureau Environmental Officer. Multi-residue methodology, as used by FDA Regional surveillance laboratories, should be applied for all samples.

Location of Laboratories

Local Salvadoran laboratory capabilities for conducting large numbers of chemical analyses should be developed and is strongly encouraged. However, for at least the first year, in the absence of demonstrated in-country capability to perform the large number of monitoring analyses needed, an illustrative budget is given below to allow sufficient funds so that samples could be shipped to a commercial laboratory in the U.S. whose credentials have been reviewed and approved by the LAC/AG Bureau Environmental Officer.

Illustrative Budget:

	$ / Year
Inspectors Salary (MAG/DDA)	0
Training of Inspectors	2,500
Transportation for Inspectors (ATAC-regular visits)	0
Freezer for Sample Storage	500
Sample Shipping Containers	250
Shipping Charges	500
Chemical Analyses @ $200/Sample	5,000
Total	$8,750

A more detailed program is given in Annex 4.

1.8. Requests for Additional Pesticides and/or Information

If project personnel determine a need for pesticides not in Table 2a or if they need additional information about the pesticides or EA procedures, they should notify AID/ES. Mr. Sergio Guzman (AID's AIFLD Project Manager) and Mr. Peter Gore (Environmental Officer) would be the contact persons for this project. Their addresses and phone numbers are given in the list of contributors of this EA. This AID office can contact AID'S Bureau of Science and Technology, Office of Agriculture for any needed assistance. Before any actual purchases, sales, or demonstrations to/with farmers of pesticides not in Table 2a, specific labels and compounds must be reviewed by the Bureau Environmental Officer.

2.0. OTHER POTENTIAL EFFECTS FROM THE PROJECT

2.1. Potential Effects on Los Cóbanos Coral Reef

The direct activities funded by the project might have only limited environmental effects due to the project only utilizing existing agricultural lands. An increase of aquaculture is more likely to contribute in the future to the reduction of adverse environmental effects through the diffusion of sound mariculture practices, which might reduce the oxygen demand and nutrient content of the return water.

The major concern, however, is related to the effects that pesticides might have on the receiving ecosystems. Some of the coastal areas have a rocky beach with some coral type formations, which forms part of the Los Cóbanos Coral Reef. As stated before, one of the conditions for this kind of life is the presence of

clear water so that light can penetrate and attached algae are able to perform photosynthesis.

Although, as was stated before, the reef is already being affected by major processes of water quality deterioration, the development of agriculture could have resulted in considerable pesticide runoff and development of areas of shrimp mariculture along the shoreline of the occidental coastal plain could further affect this ecosystem. Enriched waters from the mariculture ponds might further decrease the depth of light penetration, especially during the dry season when the heavy suspended silt load is not present. In addition to this, the presence in the return waters of residues from shrimp metabolism and oxygen demand from unutilized feedstuff could increase the effect.

The no action alternative would not change that situation. The risk of affecting this ecosystem already exists because the existence of a considerable availability of sites for mariculture is common knowledge in El Salvador. Also, the economic feasibility of mariculture is well known and the activity is expected to increase in the near future.

The project alternative would have a positive impact on this problem, because it is going to promote sound IPM practices. These practices will be promoted within the project farmers community through the extension service and technical assistance activities of the project.

An evaluation of the biological diversity associated with Los Cóbanos coral reef formation and the evaluation of the additional impact that pesticides and mariculture development can have in this ecosystem, would enhance environmental soundness of this and other AID/ES projects. Monitoring should include physical as well as biological parameters. Physical parameters should include temperature, dissolved oxygen, pH, and light penetration. Biological parameters should include productivity and species composition from both the planktonic as well as the fish and benthic community.

In order to monitor biological diversity at Los Cóbanos, AID/ES and/or DIVAGRO and DLDP could provide minor equipment additions to the ongoing Centro de Desarollo Pesquero (CENDEPESCA) project to determine the population dynamics of peneid shrimp and post larvae availability in the Salvadoran coast. CENDEPESCA, through its Sub-Director, indicated to Vega and Ward (1989) they shared their concern about the possible effect on this ecosystem and was willing to cooperate in the evaluation.

2.2. Potential Effects on Mangrove Forests

The 35 thousand plus hectares of mangrove forest now existing in El Salvador, represent one of the major forest expanses in the country. All possible efforts should be made to ensure their protection. The conservation of mangrove forests represent, in the long term, the best warranty for mariculture development because of their importance in the maintenance of estuarine productivity and its relations to shrimp populations.

In a very similar manner to that just described for the Los Cóbanos coral reef, pesticides and mariculture could be other factors potentially affecting mangrove forests. The effect of mariculture will probably be of lesser importance than firewood extraction, unless strong actions are taken to provide alternative firewood supply sources. Unfortunately, Vega and Ward (1989) found the ongoing project, MADELEÑA, was only having a modest success. AID/ES indicated no other efforts in this regard had been expended since 1989.

Coastal areas and mangrove forests in El Salvador are, as in many other countries, public property. Investors interested in mariculture need to request an authorization or concession to be able to develop any specific site. This situation provides the ideal opportunity to enforce sound regulations for conservation of mangrove forests.

However, to achieve conservation, the existence of a capable government agency is a must. In El Salvador the agency charged with the conservation of mangrove forests is the National Forest Service, a division of the Natural Resource Center (CENREN) of the MAG. During a visit by Vega (Vega and Ward 1989) to CENREN, it was observed that the staff was fully aware of the need to protect mangrove forests. Unfortunately, he also realized that their capabilities to achieve it were limited due to inadequate funds and manpower.

According to Vega and Ward (1989), although a site inspection is required prior to the authorization to establish mariculture or salt producing facilities, they did not have specific criteria or a checklist to conduct it. Setting the site limits of the proposed infrastructure development area are, therefore, left to the subjective criteria of the inspector. The law that enables the Forest Service to control these activities, mentions that they can only be approved on areas of "casilar mangrove". The technical term is not defined in the law and could not be characterized by the CENRENS's staff in terms of height, trunk diameter, or saline conditions of the soil. They did not seem to be aware of the importance of tidal fluctuations for the conservation of mangrove forests either. Another factor affecting the efficiency of regulatory measures seems to be the

decentralization of the administration. Regional offices of the MAG may give an authorization without the central office of the Forest Service even being aware of it (Vega and Ward 1989).

The "no action" alternative will have a similar deleterious effect on the mangrove forests, as stated for the Los Cóbanos coral reef, since mariculture development and pesticide use is expected to develop in the near future at a fast rate. The lack of information on how the mangrove forests could be protected is likely to allow further deforestation.

The proposed project alternative will develop and increase the consciousness for mangrove protection of the people already involved and those interested in the mariculture industry. In addition, the technical assistance package was contracted by a US firm and has the environmental component included in its technology transfer package (RPI and HAC 1989).

Development of CENREN's capabilities to exert an adequate control on the mangrove cutting could increase the beneficial environmental effects of the project on the mangrove forests, not only from pesticide runoff or drift and mariculture activities but from cutting pressure as well. This could be achieved by their participation in the technical seminars and other technology transfer activities that FUSADES/DIVAGRO has implemented in the past and will be presenting under DLDP. Usually CENREN lacks the availability of funds to pay for registration. This small quantity should be provided by the project or DIVAGRO. The implementation of a mangrove ecology and conservation seminar (Vega and Ward 1989) should also be implemented in the near future. The participation of CENREN as well as other interested government agencies (CENDEPESCA) and the general public related with mariculture and the general environment should be promoted.

2.3. Other Potential Effects

Other potential environmental effects derived from the development of agriculture and mariculture include the risk of saline intrusion of fresh water aquifers, water pollution, and disturbance of breeding, nesting or nursery areas for several species of birds, reptiles, fish, and shellfish, including shrimp.

The problem of water pollution has already been discussed in relation to the potential effect on the Los Cóbanos coral reef and mangroves. Other environments sensitive to pollution with pesticides, organic matter, and nutrients are the recreational beaches.

In other areas where the existence of this kind of sensitive ecosystem is not present, such as the main estuaries, an increased organic matter and nutrient load is argued to be beneficial rather than deleterious. This could be possible to a certain extent because of increased estuary metabolism. However, if the load is so high that the export process and the supply of oxygen from tidal effect cannot take care of the increased amount of organic matter, then the system would start to deteriorate. Long term monitoring is the only possible action.

Another aspect in relation to water pollution has to do with pesticides and residues. This is not actually an effect caused by shrimp mariculture but rather the opposite. It is a good example of conflicting human activities. The high rate of pesticide applications in certain crops such as cotton might render mariculture impossible. The technical guidelines for mariculture development sites in El Salvador already include these considerations (Mendola and Ramírez 1989). Water and soil analysis for pesticide residues should be implemented before final site selection is made. This should also be done before the establishment of project crops.

The establishment of a protective belt of about one kilometer wide between cropland and mangrove vegetation could greatly reduce the amount of pesticides entering the estuarine ecosystems. This could be combined with the promotion of planting fast growing tree species to provide firewood and reduce the pressure of that activity on the mangrove swamps as well. CENREN would be responsible for monitoring compliance with this requirement.

The other two aspects are site specific. They should be included in an overall environmental impact analysis of individual projects. The possibility of affecting fresh water aquifers should especially be addressed when infrastructure development is to take place in non-saline soils. The important thing is to check the infiltration rate of the soils to avoid pesticides (in the case of agriculture) and salt (in the case of aquaculture) from entering the underlying aquifer, in case it is present. Authorization should not be allowed in either case for sites which are actually going to disturb breeding or nesting areas, especially if endangered species are involved (Appendix 4).

V. SUMMARY OF MITIGATIVE MEASURES.

Environmental impacts of AIFLD/DLDP-ATAC will be minimal if the guidelines here are followed. Adherence to these guidelines should permit fulfillment of the Project objective of producing uniform high-quality agricultural commodities for internal consumption and for export, while maintaining environmental integrity.

A. To assure compliance with AID pesticide regulations, pesticide training and monitoring programs were outlined in this document. Execution of these programs will be a requirement for the implementation of this component. We recommend that AIFLD/ DLDP hire or reassign a technician to oversee the pest/pesticide management training, implementation, and monitoring programs. These programs must include the following:

1. Execute the pest/pesticide management training guidelines for project technicians and farmers as discussed in Section IV.1.5 and Annexes 1 and 2.

2. Execute the guidelines for the design and establishment of agrichemical microenterprises including standards for transport, storage, and safety as discussed in Sections IV.1.2., IV.1.5, and Annex 3.

B. The environmental monitoring program, as outlined in Sections III.2.6, IV.1.6, IV.1.7, and Annex 4, also will be a requirement for the implementation of the Project. Baseline sampling should be conducted before any DLDP/ATAC recommended changes are made and resampled periodically after initiation to measure project caused changes. This should include, at a minimum:

1. Samples to determine possible changes in species diversity of both plants and animals;

2. Pesticide residues in soil and surface and ground water (see minimal sampling scheme in Annex 4); and

3. Worker safety as determined by periodic blood testing for cholinesterase levels.

C. The project is designed to concentrate activities in areas already under agricultural production. However, if pesticides are used near national preserves, set-aside lands, ecologically sensitive areas, or areas designated as critical habitat for endangered species, the AID Project Manager should make sure the project complies with requirements of Section 119 of the Foreign Assistance Act.

D. The following suggestions, although not required, should also be strongly considered by the Mission and/or AID/W.

1. To assure the availability of alternative IPM strategies and an effective pesticide arsenal, it is suggested that linkages be developed with institutions (FUSADES/DIVAGRO, EAP, CATIE, etc.) with IPM research components. This will assure the use of the latest IPM technology as it becomes available.

2. To assure availability of up-to-date pesticide information and "shelf" IPM technology, AIFLD should help FUSADES develop a computer-supported technical information center to support an effective outreach program.

3. Implement the previous suggestion (Vega and Ward 1989) to provide equipment to CENDEPESCA in order for them to monitor the biological diversity actually present at Los Cóbanos coral reef and the possible effects from pesticides and mariculture on this ecosystem. This takes on added importance with the proposed expansion of agriculture in the littoral area. If not already implemented, it should be implemented in time to allow baseline samples to be taken prior to pesticide sale by the project.

4. Increased agricultural activities being promoted by this project will place added pressure on some of the mangrove areas. Therefore, the suggestion by Vega and Ward (1989) for the establishment of a protective belt between crop land and the mangrove vegetation to reduce the amount of pesticides entering the estuarine ecosystems takes on added significance. The promotion of planting fast growing tree species to provide for firewood would still be a good way to accomplish it and reduce cutting pressure on mangrove swamps as well.

5. The ATAC phase of the project will require the financial institutions, especially the Salvadoran Foundation, to include funds in their loans for the purchase and use of all appropriate protective devices and clothing if pesticides are included in the loan. The technical assistance component will furnish and require the use of these devices for project personnel if they apply pesticides.

6. Pesticides should be stored in their original containers in locked storage facilities with the key assigned only to authorized, qualified personnel. A sign in Spanish reading "Danger: Pesticide Storage

Area" should be posted. When possible, separate storage areas should be provided for herbicides and planting seeds. Pesticides should not be stored near sleeping or work areas, food, animals, or drinking water.

7. Empty pesticide containers should not be reused for other purposes since no practical methods exist for removing all toxic residues.

8. Organic fertilizer production should be considered by using the otherwise discarded material such as pulp, peelings, and culled fruits and vegetables.

9. The project should take advantage of the opportunity to stimulate more active participation of the Ministry of Agriculture in pesticide use monitoring, enforcement, and training. Several activities were suggested to accomplish this increased participation and should be followed.

10. Annual training updates of ATAC project personnel should be planned. The assistance available through a wide range of sources and the proposed IPM research linkages should be utilized in this effort. The session could include a review of the latest findings from the IPM research projects in the region.

11. Annual follow-up training sessions for both project and medical personnel should be scheduled. This will assure technicians and medical personnel remain sensitized to pesticide issues. New ATAC technicians should receive training before they go to the field for technical assistance activities. Course content should be determined, in part, on the basis of supervisor observations of violations of good practices so those issues will be stressed.

12. It is proposed that the AIFLD/DLDP-ATAC project coordinator hire or reassign a technician to coordinate the pest/pesticide management training and monitoring program to assure success of the program and project.

13. Baseline pesticide intoxication data should be recorded for each project area prior to project initiation. Data from subsequent years will be evaluated at the first scheduled project evaluation to determine the effectiveness of these mitigative actions.

III. Additional issues related to this EA which were requested in the Scope of Work.

Suggestions related to those proposed by Higgins et al. (1988) as required in the Scope of Work, see Appendices 1 and 3:

A. Conduct research to determine the efficacy of less toxic, general use chemicals such as those being suggested for use on this project (Table 2a). Adaptive research will be required to test chemical alternatives and to refine this list. Farmers are familiar with the use of certain chemicals (mostly restricted use) and will continue to use them unless additional information is made available and alternatives are offered. Alternatives must be equally priced or they will be undersold by the more toxic chemicals (Sections III.2.2, 2.3, and 2.4).

FUSADES/DIVAGRO is conducting such trials for non-traditional export crops. CENTA should be encouraged to do similar research on the basic grains and other project crops as part of their IPM (MIP) projects.

B. The current exchange rate does not overly encourage the importation of agricultural inputs, including pesticides. However, the Central Bank (CB) still treats the importers of agrichemicals preferentially. AID/ES still should consider working with DDA, CB, and Economia Agropequaria to encourage the cancellation or restriction of the importation and/or sale of the more highly toxic chemicals. Higgins et al. (1988) further suggested an alternative of a quota system or tax levied on the more toxic chemicals to discourage their importation and use. Import or registration fees could then be used to directly support safety and monitoring programs and IPM research and development.

C. Salvadoran banks have traditionally offered bland loans for the purchase of pesticides, but not for alternative pest control measures. This practice amounted to a subsidy for pesticide inputs. AID/ES is currently working with the Agricultural Bank (BFA) to phase them out of the business of selling agrichemical inputs which should help reduce their promotion of pesticide use.

Project farmers will have access to safety equipment through the cooperative microenterprises and ATAC technicians will see that they use that equipment. This could be enhanced by requiring bank loan officers to attend pest/pesticide management classes to learn the need for such equipment. AID/ES indicated that the Agrarian Reform Credit Project 519-0307 is being extended for 1-2 more years and such

training could be required in that project. Project loan officers should also be required to attend such training.

D. The recommendation that IPM should be an explicit component of all future agricultural development projects, including AID projects in El Salvador, has not been uniformly initiated. The Amendment No. 4 of the Agribusiness Development Project (519-0327) had an IPM component (Vega and Ward 1989), but none of the other projects (including this one) have had an IPM component.

E. The recommendations on training mostly have been addressed in previous items in this section, in previous AID/ES efforts (such as the Water Management Project as suggested by Higgins et al. 1988), and in the current project EA. However, public health official training and information needs still need to be addressed. It is recommended that the health program of AIFLD join the project in providing pertinent information on pesticide poisoning and treatment to health institutions in project areas. They should also be encouraged to register intoxication cases with the Ministry of Health.

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LIST OF ANNEXES

ANNEX 1

Estrategia de Capacitación Sobre Manejo de Plaguicidas y Precauciones en su Uso para Técnicos y Empleados de los Agro Servicios

ANEXO 1

ESTRATEGIA DE CAPACITACION SOBRE MANEJO DE PLAGUICIDAS Y PRECAUCIONES EN SU USO PARA TECNICOS Y EMPLEADOS DE LOS AGRO SERVICIOS

1. El buen manejo de plaguicidas se fundamenta en el concepto básico de que todos los químicos son potencialmente peligrosos y deben usarse cuidadosamente. Observando las precauciones que se dan a conocer a continuación, reducirá el riesgo involucrado en el manejo de plaguicidas.

2. La persona encargada (un Ingeniero Agrónomo o un Técnico autorizado) del Agroservicio, es personalmente responsable para asegurar que cada empleado esté adecuadamente entrenado en el manejo de todo tipo de plaguicidas y sus peligros. Además, esta persona debe tener en cuenta que él es el único responsable de lo siguiente:

   - La salud ocupacional del personal en el establecimiento.

   - La higiene industrial y seguridad del local.

   - La protección del medio ambiente.

3. El personal no debe fumar ni comer mientras esté vendiendo plaguicidas. Debe lavarse las manos con agua y jabón después de haber manipulado un envase de plaguicidas, para comer o hacer otras tareas.

4. El supervisor o persona encargada debe colocar una lista con números telefónicos de médicos, clínicas y cuerpo de bomberos así como direcciones de emergencia cerca de un teléfono en el área de trabajo. El personal debe fijarse dónde está la información y aprender a usarla.

5. El personal que trabaja en estos comercios debe aprender lo que recomiendan las etiquetas de los productos sobre lo siguiente: (1) equipo protector, (2) prácticas de seguridad y (3) primeros auxilios. Sobre todo, deben prestar atención a la palabra de señal incluida en cada etiqueta. Esta palabra le avisa cuan peligroso es el plaguicida.

6. Es de suma importancia que todo el personal conozca los plaguicidas, los síntomas de sobre exposición a ellos y un médico que pueda ser llamado rápidamente. En el caso de que aparezcan síntomas (pupilas contraídas, visión borrosa, náuseas, dolor de cabeza severo, mareo), dejar de trabajar inmediatamente y buscar un médico.

7. Todo el personal debe estar debidamente prevenido para hacer frente ante cualquier accidente. Todo derrame o goteo de plaguicidas deberá tratarse como emergencia y el personal

deberá iniciar el trabajo de limpieza inmediatamente, tomando las debidas precauciones.

8. Los problemas asociados con el uso y manejo de plaguicidas pueden evitarse si se cumple con lo siguiente: (1) aprender a usar plaguicidas de una manera segura, a fin de prevenir la sobre exposición y las enfermedades de corto y largo plazo resultantes, o aún la muerte; (2) evitar prácticas no seguras que puedan causar daño a las personas, a las plantas o animales en el medio ambiente; (3) obedecer todas las leyes que aplican al manejo de plaguicidas, su almacenamiento y eliminación bajo las condiciones de trabajo; y (4) desarrollar hábitos seguros de trabajo.

9. Para satisfacer el inciso anterior, se debe establecer un programa de capacitación en el buen manejo de plaguicidas, con estándares mínimos, para toda persona que va a manejar o usar plaguicidas como parte de su trabajo. Esta capacitación tendrá que incluir información sobre la lectura y comprensión de las indicaciones que aparecen en las etiquetas de los productos.; los métodos apropiados para mezclar y aplicar químicos plaguicidas; el manejo y eliminación de plaguicidas; el reconocimiento de síntomas de envenenamiento causado por los plaguicidas; los tipos de equipo protector que se debe usar; los procedimientos de seguridad a seguirse; los peligros de comer, beber o fumar mientras se manejen plaguicidas; donde ir para recibir tratamiento médico de emergencia; leyes y reglamentos vigentes, además pueden incluirse otros temas.

10. Se adjunta un programa ilustrativo, para la capacitación requerida. Antes de iniciar su empleo cada persona tendrá que tomar un cursillo que enseñe los temas indicados. La capacitación debe repetirse cada año.

PROGRAMA ILUSTRATIVO:
CURSILLO SOBRE EL BUEN MANEJO DE PLAGUICIDAS

1. Clasificación y presentación de los Plaguicidas.
2. Conceptos importantes relacionados con Toxicidad.
3. Legislación sobre manejo de Plaguicidas.
4. Las etiquetas de los Plaguicidas.
5. Riesgos de intoxicación en el uso de Plaguicidas.
6. Disposiciones preventivas en la adquisición.
7. Precauciones en el uso de los Plaguicidas.
8. En caso de intoxicación.
9. Equipo de aplicación y calibración de aspersoras.
10. Métodos de aplicación de los Plaguicidas.
11. Efectos de los Plaguicidas después de su aplicación.

ANNEX 2

Estrategia de Capacitación Sobre Manejo de Plagas/Plaguicidas para Agrónomos Participantes en el Programa de Servicios Técnicos de AIFLD

ANEXO 2

ESTRATEGIA DE CAPACITACION SOBRE MANEJO DE PLAGAS/PLAGUICIDAS PARA AGRONOMOS PARTICIPANTES EN EL PROGRAMA DE SERVICIOS TECNICOS DE AIFLD

1. Desde hace ya más de veinte años se ha llegado a la conclusión que el buen manejo de plagas se basa en la filosofía conocida como "manejo integrado de plagas" (MIP).

2. El MIP es un sistema integrado de manejo de plagas que busca reducir las poblaciones de plagas a niveles por debajo de los que causan daños económicos. Ello combina todos los métodos tradicionales para matar y controlar plagas, pero a la vez tomando en cuenta la relación compleja entre plagas, organismos benéficos, y el medio ambiente.

3. Básicamente, la estrategia de MIP es confiar en lo posible en los enemigos naturales y otros factores de regulación de plagas, tales como el clima y prácticas culturales, mientras se vigilan las poblaciones de plaga en forma cuidadosa. Se utilizan plaguicidas selectivos cuando éstos son requeridos, efectivos y disponibles.

4. Las técnicas usadas en el MIP son métodos de control que están más en armonía con los principios ecológicos, biológicos y socioeconómicos. Los programas de manejo integrado de plagas tratan de reducir los costos de producción, incrementar la eficiencia de las tácticas de control y disminuir los riesgos de contaminación por plaguicidas en el medio ambiente.

5. Se hace necesario el desarrollo de estrategias de control de plagas que sean menos dependientes en el uso de plaguicidas por tres razones principales:

   a) Para disminuir el desarrollo de resistencia a los plaguicidas en las plagas.

   b) Para controlar plagas que ya son resistentes a los plaguicidas y aquellas que también han desarrollado resistencia cruzada, y

   c) Para proteger a los enemigos naturales de plagas, polinizadores, el medio ambiente así como la salud humana y animal.

6. Los principios a seguir en el desarrollo de un programa de manejo integrado de plagas son los siguientes:

   a) Identificar las principales plagas y establecer niveles de daño económico,

   b) Elegir la mejor combinación de técnicas de control,

c) Muestrear y monitorear el cultivo regularmente,

d) Usar todos los métodos de control de una manera correcta y segura,

e) Cumplir con todos los controles legales, y

f) Desarrollar programas de educación, capacitación y demostración para agricultores y extensionistas.

7. Entre los objetivos de un programa de capacitación en la materia, resaltan los siguientes:

a) Reducir el nivel de plaguicidas en el medio ambiente,

b) Aumentar la predictabilidad y por ende, la eficacia de las técnicas de control de plagas, y

c) Aumentar el uso de métodos naturales de control de plagas.

8. Adjunto se encuentra un programa ilustrativo para la capacitación requerida en el manejo integrado de plagas. Cada técnico que funcione como asesor de los productores afiliados con las cooperativas, tendrá que asistir a un cursillo que ofrece los temas indicados en los primeros seis meses de trabajar en el proyecto. Además, el técnico también tendrá que tomar el cursillo sobre el buen manejo de plaguicidas.

PROGRAMA ILUSTRATIVO:
CURSILLO SOBRE MANEJO INTEGRADO DE PLAGAS

1. Introducción a las Plagas
2. Historia de Manejo Integrado de Plagas
3. Principios y Tácticas del MIP
4. El Muestreo y Monitoreo de Plagas
5. Niveles de Daño Económico
6. Control Cultural
7. Uso de Variedades Resistentes
8. Control Biológico
9. Control Químico
10. Conceptos sobre Manejo Integrado de Plagas en Enfermedades
11. Las Malezas en el Contexto del MIP
12. La Importancia de Semioquímicos (Feromonas) en MIP

ANNEX 3

Guías para el Manejo Seguro de los Plaguicidas Durante su Comercialización, Transporte, Almacenamiento, y Eliminación

ANEXO 3

GUIAS PARA EL MANEJO SEGURO DE LOS PLAGUICIDAS DURANTE SU COMERCIALIZACION, TRANSPORTE, ALMACENAMIENTO, Y ELIMINACION

A. Consideraciones Generales:

1. Todo producto adquirido para su comercialización deberá estar previamente inscrito en el registro que al efecto lleve la Dirección de Defensa Agropecuaria.

2. Los establecimientos tendrán al frente del expendio un Ingeniero Agrónomo o un Técnico autorizado por el Ministerio de Agricultura y Ganadería.

3. La persona encargada debe tener en cuenta que él es personalmente responsable de lo siguiente:

   - la salud ocupacional del personal en el establecimiento.

   - La higiene industrial y seguridad del local.

   - La protección del medio ambiente.

4. El personal que trabaja en estos comercios debe estar adecuadamente entrenado en el manejo de todo tipo de plaguicidas y sus peligros.

B. De los Locales para Expendio:

5. El local debe ser amplio y con ventilación adecuada. Los techos de dichos locales tienen que ser a prueba de lluvias y en caso de incendio, deber permitir el escape de gases y calor. Los pisos deben estar en buenas condiciones y ser de cemento u otro material que facilite la labor de limpieza y que sean impermeables a los líquidos. También éstos deben estar diseñados para contener derrames o agua contaminada, por ejemplo, por medio de una barrera de 15 cms.

6. Los expendios deberán estar ubicados en sitios distantes, por lo menos a 25 metros de aquellos comercios destinados a la venta de productos alimenticios elaborados o por elaborar y a no menos de 100 metros de las industrias procesadoras de alimentos e instituciones educacionales, recreacionales y asistenciales. Además, estos establecimientos no deberán ubicarse cerca de casas residenciales, fuentes de agua potable y áreas sujetas a inundaciones.

7. La venta de plaguicidas sólo se permitirá en sus envases originales, estando terminantemente prohibido el trasegado y el re-envasado de dichos productos.

8. Queda terminantemente prohibida la venta de plaguicidas a menores de edad. Asimismo, éstos últimos no podrán trabajar en los expendios.

9. El sitio destinado al expendio debe estar totalmente separado de aquel destinado al depósito, el cual debe ser mantenido cerrado y estar dotado de ventilación suficiente.

10. Los expendios deberán disponer de servicios sanitarios consistentes en duchas, lavamanos y excusado con agua corriente y en buenas condiciones de funcionamiento. De igual manera, deben tener un botiquín de primeros auxilios y una reserva de equipo y material destinado a enfrentar cualquier accidente o emergencia (derrames, goteos, incendios, etc.).

C. Del Personal y sus Responsabilidades:

11. El personal no debe fumar ni comer mientras está vendiendo plaguicidas. Debe lavarse las manos con agua y jabón después de haber manipulado un envase de plaguicidas, para comer o hacer otras tareas.

12. El personal que efectúe operaciones de carga, descarga y movilización de plaguicidas, deberá estar dotado de equipo de protección individual adecuado. En caso de rotura de envases o pérdida de substancias se extremarán las medidas de seguridad.

13. El personal al que se refiere el párrafo anterior, debe ser sometido a examen médico pre-empleo y estar bajo control médico periódico, no pudiendo ser el lapso entre estos exámenes mayor a seis meses. Un hospital o laboratorio calificado hará los exámenes y se mantendrán registros detallados de los resultados.

14. Se harán arreglos de antemano con una clínica o médico local para prestar ayuda inmediata en caso de una emergencia, como una intoxicación aguda. La clínica o médico tendrán que ser informados de la naturaleza de los productos en venta y ellos deberán mantener los antídotos necesarios.

15. Asimismo, el local tendrá de antemano que llegar a un acuerdo con los bomberos locales a fin de que ellos provean asistencia inmediata en caso de un incendio. Se deberá proporcionar al cuerpo de bomberos información sobre la naturaleza de los productos químicos vendidos o almacenados en el expendio.

16. El agroservicio tiene la obligación de mantener un registro permanente de las cantidades distribuidas y vendidas de cada uno de los plaguicidas, el mismo que debe llevar a conocimiento de la Dirección de Defensa Agropecuaria semestralmente.

D. Del Transporte:

17. Queda prohibido el transporte de plaguicidas en vehículos que habitualmente se utilizan para transportar alimentos, bebidas y/o medicinas.

18. Antes de cargarlo con plaguicidas, la condición del vehículo deberá revisarse, asegurando que el peso del transporte sea de material lavable, evitando el uso de camas de madera. Asimismo, se debe evitar pisos inseguros o con salientes que puedan dañar los envases.

19. En la carga y descarga de plaguicidas, debe usarse únicamente equipo y herramientas que no dañen los envases. En especial, no debe recurrirse al empleo de ganchos que puedieran pinchar o rasgar los envases.

20. Los plaguicidas no podrán cargarse en el mismo vehículo que alimentos y otros materiales destinados para el consumo y uso de personas o animales y deben transportarse en envases seguros, los cuales serán ecomodados en el medio de transporte, de tal manera que estén asegurados firmemente en un lugar donde nadie pueda contaminarse si se derraman.

21. De igual manera, nunca lleve plaguicidas en el compartimiento para pasajeros de un vehículo. Además, un extinguidor adecuado y equipo protector y de limpieza deberá tenerse disponible para uso del chofer.

22. En caso de rotura de envases o escape de plaguicidas, el medio de transporte deberá lavarse para evitar posibles contaminaciones posteriores y los residuos que se puedan recoger, deberán enterrarse a no menos de un metro de profundidad.

E. Del Almacenamiento:

23. En los locales se deberá destinar un lugar especial para el almacenamiento de los plaguicidas y no deberán almacenarlos en forma mezclada con otros insumos agrícolas. Este lugar debe estar cerrado con llave y candado; además, las paredes y las puertas de acceso deben tener carteles y avisos de peligro en letras claras.

24. Los envases de los plaguicidas deberán ser controlados a su llegada al expendio por medio de una identificación, cantidad y condición. Si no están en buenas condiciones, o por cualquier razón presentan un peligro, deberá tomarse la acción apropiada.

25. Los plaguicidas deben guardarse siempre en sus envases originales, bien tapados y conservando la etiqueta

correspondiente, en buenas condiciones para permitir su lectura.

26. Los envases de plaguicidas no deben guardarse en el suelo. Es mejor y más seguro colocarlos en los estantes adecuados.

27. No permita el acceso de niños o personas no autorizadas al lugar de almacenamiento de plaguicidas.

28. Deben ubicarse extintores de polvo químico seco o dióxido de carbono en la entrada de la bodega y en el exterior de la misma, se colocará un rótulo prohibiendo fumar y encender llamas abiertas.

29. El encargado de la bodega deberá efectuar revisiones periódicas para detectar derrames, roturas, corrosión y deterioro general de los envases.

30. Asimismo, el encargado de la bodega debe mantener un inventario actualizado de todos los plaguicidas, debidamente ubicados en la bodega, de acuerdo a su uso, estabilidad y reactibilidad de los productos, tipo de envases, etc.

F. De la Eliminación de los Envases:

31. Los envases vacíos de los plaguicidas pueden eliminarse de varias maneras. El método apropiado depende del tipo de envase y del plaguicida que contiene. Lea la etiqueta para verificar si contiene instrucciones especiales para la eliminación de envases vacíos.

32. Si los envases pueden quemarse, use un incinerador especial de alta temperatura. No queme los envases vacíos al aire libre ni en un incinerador común.

33. Los envases vacíos son peligrosos. No los tire en ríos,arroyos, lagunas, charcos, ni los deje en cualquier lugar.

34. Nunca vuelva a usar un envase vacío de plaguicida. No guarde comida, agua potable, alimentos para animales ni semillas en los envases vacíos de plaguicidas. El agua, comida o alimento puede contaminarse y causar envenenamiento.

35. Los envases que no pueden quemarse pueden ser enterrados. Por lo general, éstos son de vidrio, plástico o metal. Aplaste el metal, rompa el vidrio con cuidado y corte el plástico para reducir el tamaño de los envases y poder guardarlos más facilmente.

36. Guarde los envases aplastados o rotos en un lugar de eliminación o almacenamiento cerrado con llave hasta que llegue el momento de tirarlos. Una manera de eliminar los

envases aplastados es enterrarlos. Escoja un lugar alejado de las vías de agua y las zonas habitadas para esta operación.

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ANNEX 4

Programa de Vigilancia de Prácticas de Manejo de Plagas/Plaguicidas en el Proyecto de Servicios Técnicos de AIFLD, con un Esquema de Monitoreo Ambiental

ANEXO 4

PROGRAMA DE VIGILANCIA DE PRACTICAS DE MANEJO DE PLAGAS/PLAGUICIDAS EN EL PROYECTO DE SERVICIOS TECNICOS DE AIFLD, CON UN ESQUEMA DE MONITOREO AMBIENTAL

El Gerente de la AIFLD del Proyecto, y el Coordinador del Programa P/PM de AIFLD controlarán el uso apropiado de los plaguicidas por el personal del proyecto y los agricultores a fin de detectar y ayudarlos a corregir problemas potenciales con sus programas de control de plagas. El coordinador de P/PM será responsable de desarrollar un plan para monitorear: (1) prácticas de uso seguro de los plaguicidas por el personal del proyecto y agricultores participantes, (2) la eficacia de los plaguicidas, incluyendo un aumento en tasas o frecuencia de aplicación e indicaciones de bajos resultados en el control de plagas, (3) impactos potenciales sobre el medio ambiente, especialmente cambios en las poblaciones de enemigos naturales y la ocurrencia de brotes de plagas secundarias o de otras que anteriormente no tenían importancia. Se adjunta un plan provisional de monitoreo que podría servir como modelo.

Otro aspecto importante del monitoreo incluye el de los residuos de plaguicidas en los cultivos. Un programa de monitoreo de residuos debe establecerse a fin de asegurar que los residuos de los plaguicidas aprobados no excedan los niveles de tolerancia establecidos por el EPA y además, comprobar que los productos químicos no aprobados, no fueron usados. Para esta clase de monitoreo también se adjunta un plan provisional.

El laboratorio analítico de plaguicidas de CENTA en San Andrés tiene la habilidad de analizar muestras de residuos en base a una cuota por servicios, aunque ellos pudieran necesitar asistencia monetaria para obtener los reactivos y otros materiales necesarios. Además, dentro de un año, un laboratorio similar estará funcionando como parte del proyecto FUSADES/DIVAGRO; así ellos también podrán hacer los análisis requeridos. Si el gerente de la AID del proyecto determina que el laboratorio del CENTA no puede participar en este programa de monitoreo, debido a limitaciones en personal o equipo, entonces las muestras deberán enviarse a un laboratorio comercial en los EE.UU., cuyas credenciales hayan sido revisadas y aprobadas por el Oficial del Medio Ambiente del LAC Bureau de la AID en Washington, D.C.

(A) PLAN PROVISIONAL PARA EL MONITOREO DE RESIDUOS DE PLAGUICIDAS EN EL MEDIO AMBIENTE

El propósito de todos los programas de monitoreo es la protección de la salud, del bienestar humano y del medio ambiente. El monitoreo de los plaguicidas es un proceso de seguimiento de un químico dado en el medio ambiente y, como tal, es un ingrediente esencial de manejo seguro de los plaguicidas. La amplia

disponibilidad y uso de plaguicidas resulta en una exposición del hombre a ellos y/o una contaminación de sus alimentos y el medio ambiente. El término "monitoreo" conlleva el significado de una mesuración de cambio hecho sobre un período de tiempo. Hay varias clases de monitoreo pero las dos que nos interesan son el "monitoreo de vigilancia" y el "monitoreo subjetivo".

El monitoreo de vigilancia consiste en un programa de observaciones hechas periódicamente para reforzar un programa reglamentario y asegurar el cumplimiento de las leyes.

El monitoreo subjetivo es un programa de evaluación al azar, emprendido por varios propósitos, por ejemplo, la investigación de un derrame accidental o la determinación de niveles de peligro generales. Los programas de monitoreo que se detallan a continuación pertenecen al uno o al otro de estas dos clases.

AIFLD tiene contemplado establecer dos agroservicios en el primer año del proyecto; uno en la región Occidental del país y el otro en la parte Paracentral. En años venideros se establecerán más agroservicios en otras regiones. El área cubierta de las actividades planeadas por el proyecto es muy extensa y atraviezan muchos ríos. Por lo tanto, deberán tomarse muestras en los ríos más cercanos a las cooperativas servidas por los agroservicios, con el fin de determinar el impacto de producción de los diversos cultivos. Deberán tomarse muestras de agua y sedimento de las camas de los ríos, aproximadamente unos 3000 metros río arriba de las cooperativas y 500 metros río abajo. Una indicación del impacto de los agroquímicos sobre la vida acuática, sería una disminución en la abundancia de las especies más comunes. Se deberán tomar datos como base estableciendo los niveles de abundancia de la vida acuática, tan pronto como sea posible y deberán repetirse por lo menos dos veces al año dentro de la misma estación.

Las fuentes de agua potable cercanas a las cooperativas también deberán muestrearse para medir el posible impacto resultante del uso de los plaguicidas. Posibles sitios para la toma de muestras se indican en hoja adjunta. En resumen, las siguientes muestras son necesarias:

REGION OCCIDENTAL

2 muestras de agua por sitio (Río abajo y río arriba)

2 muestras de sedimento por sitio

2 muestras de la vida acuática por sitio

REGION PARACENTRAL

2 muestras de agua por sitio (Río abajo y río arriba)

2 muestras de sedimento por sitio

2 muestras de la vida acuática por sitio

AGUA POTABLE

1 muestra por sitio

Estas muestras de residuos de plaguicidas deberán tomarse en duplicado, por lo menos dos veces durante el ciclo de producción de los cultivos. Las colecciones deben hacerse después de períodos de uso fuerte de plaguicidas, especialmente si esto coincide con aguaceros en el área. Estos datos representarían los casos peores. Los resultados de los análisis determinarán si son necesarios muestreos adicionales o si hay áreas que requieren mayor esfuerzo.

En el caso de encontrar pájaros o animales pequeños muertos en áreas agrícolas, aparentemente por causa natural, deberán ser analizados para determinar si se encuentran residuos de plaguicidas. Asimismo, las muestras tomadas por muerte masiva ocurrida en aves o peces deberán investigarse para determinar si existe alguna relación con el uso de plaguicidas en el área.

Una evaluación del efecto de los plaguicidas sobre la población laboral también deberá efectuarse. La determinación de los niveles de colinesterasa en la sangre de los trabajadores/aplicadores expuestos a los plaguicidas inhibidores del acetil-colinesterasa es un método indirecto para medir la exposición laboral a plaguicidas. Deben tomarse muestras de sangre de cinco trabajadores por cada cooperativa escogida, antes de que se inicie la temporada de aplicación de plaguicidas. Después, deberán tomarse muestras a los mismos cinco trabajadores cada cuatro semanas y al final de la temporada. Además de la sangre, un análisis de los metabolitos de los plaguicidas en la orina ofrece una alternativa para evaluar la exposición del hombre a los plaguicidas.

REGION OCCIDENTAL

1) Cooperativa : La Palomera
Cantón : La Preza
Municipio : El Congo
Departamento : Santa Ana (Río Agua Caliente I)

2) Cooperativa : Brisas Unidas
Cantón : El Rodeo y San Juan
Municipio : Tacuba
Departamento : Ahuachapán (Río de Tacuba)

3) Cooperativa : El Triunfo de Tacuba
Cantón : Sustecuma
Municipio : Tacuba
Departamento : Ahuachapán (Río Nejapa)

4)Cooperativa : El Confín
Cantón : Chiquihuat
Municipio : Nahuilingo
Departamento : Sonsonate (Río Chiquihuat)

5) Cooperativa : Jerusalén
Cantón : Chiquihuat
Municipio : Nahuilingo
Departamento : Sonsonate
(Río Chiquihuat)

REGION PARACENTRAL

1)Cooperativa : Brisas Marinas
Cantón : Las Hojas
Municipio : San Pedro Masahuat
Departamento : La Paz (Río Jiboa)

2)Cooperativa : La Nueva Fe
Cantón : Las Isletas
Municipio : San Pedro Masahuat
Departamento : La Paz (Estero de Jaltepeque)

3)Cooperativa : Unión San Rafael
Cantón : Santa Lucía
Municipio : La Paz
Departamento : La Paz (Río Nuevo)

4)Cooperativa : Costa Azul
Cantón : El Carao
Municipio : Tecoluca
Departamento : San Vicente (Río Agua Caliente II)

5)Cooperativa : San Antonio "El Rebelde"
Cantón : El Rebelde
Municipio : San Vicente
Departamento : San Vicente (Río Lempa)

(B) PLAN PROVISIONAL PARA EL MONITOREO DE RESIDUOS DE PLAGUICIDAS EN LOS CULTIVOS

Siempre que se usan plaguicidas, éstos permanecen como un residuo sobre la superficie tratada por un período de tiempo. La cantidad de residuo permisible que puede permanecer en productos agrícolas es restringida por ley a un nivel que provea un amplio margen de seguridad. Cuando se aplican los plaguicidas en forma adecuada, usualmente los residuos no exceden las tolerancias legales. Varios factores pueden influir en los niveles de residuos de los plaguicidas en la producción de cultivos, a saber:

(1) Si el cultivo ha acumulado el plaguicida del suelo,

(2) si las plantas han recibido aplicaciones de un plaguicida no registrado por ese cultivo,

(3) si se ha aplicado demasiado plaguicida al cultivo,

(4) si el plaguicida es aplicado demasiado próximo al tiempo de cosecha, o

(5) si el cultivo ha recibido el arrastre de plaguicidas de otras áreas.

Una manera de evitar problemas de residuos de plaguicidas es leer y seguir cuidadosamente las instrucciones que aparecen en la etiqueta. A fin de determinar si los niveles de residuos de los plaguicidas aprobados no exceden los niveles de tolerancia establecidos por la EPA y comprobar que los productos químicos no aprobados no fueron usados, se establece el siguiente plan de muestreo:

A la hora de obtener una muestra de la cosecha para análisis de residuos, es necesario planear la labor de una manera práctica y realista si se desea que los resultados analíticos tengan validez y confiabilidad. Hay una serie de factores que habría que tomar en cuenta en la toma, manipulación, empaque o preparación de la muestra para evitar varios problemas que pudieran ocurrir como, por ejemplo, la contaminación de la muestra, daño o deterioro de la muestra, etc. Por lo anterior, los responsables de tomar las muestras deben recibir un entrenamiento acerca de los procedimientos apropiados. Una discusión técnica de lo anteriormente expuesto se encuentra en la publicación "Recomendaciones en el Muestreo para Determinación de Residuos de Plaguicidas y Contaminantes Alimenticios", por Gloria Ruth Calderón (CENTA, Manual Técnico No. 9, marzo de 1985, El Salvador)

Posibles cultivos para la toma de muestras, son ajonjolí, melón, café y tomate. También deberán tomarse muestras de los granos básicos - maíz, frijol y arroz - como marco de referencia para estudios futuros. Los sitios actuales seleccionados para la toma de muestras de la cosecha deberán hacerse según el patrón de uso de los plaguicidas y la importancia del cultivo.

LIST OF APPENDICES

APPENDIX 1.

Scope of Work for EA Team for the AID/ES Democratic Labor Development Project No. 518-0368

Proposal Submitted to American Institute for Free Labor Development
for an Environmental Assessment of the
Agronomic Technical Assistance Component of the
Democratic Labor Development Project (519-0368)

by

Consortium for International Crop Protection

May 31, 1991

A. BACKGROUND

The Democratic Labor Development Project is being implemented through a cooperative agreement with the American Institute for Free Labor Development (AIFLD). The project seeks to consolidate and expand the democratic labor movement in both urban and rural sectors of El Salvador by improving the services provided to members by democratic trade unions. A relatively new subactivity of this project is the development and extension of simple agronomic technical packages that include agrochemicals.

Some of the pesticides commonly used in El Salvador because of their availability, low cost, familiarity or perceived effectiveness are in the U.S. Environmental Protection Agency (EPA) Restricted Use category. A few others are not registered by EPA. Integrated pest management (IPM) and the economic and environmental benefits associated with it remain poorly understood.

The project's Initial Environmental Examination (IEE) found that adverse environmental impacts could result from the pest/pesticide management components of the technical assistance packages and from microenterprise credit programs, including assistance for the establishment of small, cooperative-oriented agrochemical stores. Accordingly, an Environmental Assessment (EA) will be carried out for the agronomic technical assistance component of the project to ensure that it complies with U.S.A.I.D. environmental regulation 22 CFR Part 216. The EA will be conducted by the Consortium for International Crop Protection (CICP), 4321 Hartwick Road, Suite 404, College Park, MD 20740 USA (telephone: 301-403-4223, fax: 301-403-4226).

The purpose of the EA and the scope of work for the specialists to conduct it are clearly indicated in the attachment to this proposal, which was mailed to CICP on April 5, 1991 by Edwin Palenque, Country Program Director, AIFLD, San Salvador.

B. PURPOSE OF SERVICES

The purpose of the CICP services to AIFLD, described in C. SCOPE OF WORK below, is to:

1. Recommend mitigative actions to ensure that pesticide use supported directly or indirectly by the project does not result in adverse impacts on humans or the environment.

2. Provide guidelines for the development of technical assistance programs for farmers that adequately address pest and pesticide management concerns.

3. Provide guidelines for training AIFLD technical assistance personnel such that they will attain an adequate level of competence in pest and pesticide management.

4. Provide guidelines for the design and establishment under the project of a system of agrochemical microenterprises that comply with the Government of El Salvador (GOES) and A.I.D. pesticide laws and regulations.

All services will be developed in consultation with U.S.A.I.D./El Salvador and in accordance with specific terms of reference in the statement of work that AIFLD sent to CICP April 5, 1991. To the extent possible, recommendations for pest and pesticide management activities under the Democratic Labor Development Project are to be related to U.S.A.I.D./El Salvador actions based on recommendations provided in the 1988 "Environmental Assessment of Pest Management Practice and Pesticide Use in El Salvador," prepared by CICP.

C. SCOPE OF WORK

1. Nature of Technical Assistance

The attached statement of work from AIFLD identifies tasks to be performed by CICP. The CICP specialists will perform all of the work indicated in Section IV. TEAM TASKS AND RESPONSIBILITIES (pp. 2-4) of the attachment. Two CICP team members (see D. PERSONNEL below), Drs. Charles R. Ward and Donald J. Calvert, will participate in the EA work in El Salvador. Dr. Charles R. Ward, Team Leader, will travel from Albuquerque, New Mexico and Dr. Donald J. Calvert, Crop Protection Specialist will travel from Richmond, California. CICP technical assistant specialist, Dr.

Carl S. Barfield will coordinate preparation of the EA document out of Gainesville, Florida.

The CICP Crop Protection Specialist, Dr. Donald J. Calvert, will work closely with the Team Leader, and U.S.A.I.D. and AIFLD personnel in El Salvador for twenty-four days from July 15 to August 9, 1991 and is responsible for: 1) preparing three concise Spanish-language manuals for use in project design and implementation, on * Pest/pesticide management training strategy for project technical assistance staff (with illustrative program) * pesticide handling and safety training strategy for managers and participants in agrochemical microenterprise program activities (with illustrative program) * a U.S.A.I.D./AIFLD monitoring program that will ensure agrochemical microenterprise compliance with GOES and A.I.D. regulations; and 2) submitting his assessments and the three manuals (all to be in Spanish) to the Team Leader as the bases for the EA and EA appendices, respectively; 3) assist the Team Leader in preparation of the document as requested.

AIFLD will provide a crop protection specialist to work closely with the CICP team and is responsible for: 1) assessing pest management needs and pesticide use patterns on target crops, identifying the pesticides most frequently used with project support; 2) assessing project capability for providing adequate technical assistance to farmers and guidance to agrochemical microenterprises in the areas of IPM, pesticide management, and pesticide safety.

Dr. Charles R. Ward, Team Leader, will be responsible for guiding and supporting all aspects of EA development and collaborating in its preparation as much as possible. In particular, he will: 1) work closely with interested AIFLD and Mission personnel as well as with the Crop Protection Specialists during fifteen days of field work in El Salvador, from July 15 to July 31, 1991, conducting (joint) briefing and debriefing sessions for the Mission and AIFLD at the beginning and end of that period; and 2) review the list of requested pesticides for appropriateness and compliance with A.I.D. and GOES regulations. Using the reports and manuals prepared by the Crop Protection Specialists, he will prepare a rough draft English-language EA (outline form is acceptable), including a summary of recommendations and the Spanish-language manuals as appendices, for review by the Mission at the end of the field work period. The finalized EA should incorporate the Mission's comments and recommendations. Dr. Charles R. Ward has an additional seven working days in Albuquerque, NM to complete and revise the EA plus appendices for final submission to U.S.A.I.D./El Salvador.

Dr. Carl S. Barfield will review the EA to ensure accuracy and compliance with 22 CFR Part 216 requirements.

2. Implementation plan and outputs
Proposed timetable for CICP services and products:

Service/Product	July 1991	August 1991	September 1991
Calvert & Ward arrive in San Salvador	14		
Calvert & Ward in El Salvador: brief Mission & AIFLD staff; perform field work; write rough draft EA with summary of recommendations, and appendices	15----31		
Ward & Calvert debrief Mission & AIFLD staff presenting draft EA & appendices for review and comment	31		
Ward departs El Salvador		1	
Calvert & local Crop Protection Specialist work further on reports and appendices in El Salvador, incorporating Mission comments and recommendations		1----9	
Calvert departs El Salvador		10	
Calvert and local Crop Protection Specialist submit concise reports and EA appendices to Team Leader		13	
Ward and Calvert finish draft EA and appendices		14--23	
Ward submits draft EA to Barfield for CICP review		26	
Barfield reviews draft EA		28---------2	
Ward & Calvert revise draft EA and Appendices			4---6
Ward submits draft EA to Barfield for final CICP review			9
Barfield submits final EA to CICP for copying and distribution to U.S.A.I.D./El Salvador			11
CICP submits six copies of final EA to U.S.A.I.D./El Salvador. The body of the EA is to be in English, and the appendices in Spanish.			16

3. Reporting

The CICP team and the local Crop Protection Specialist will report to the appropriate officers at U.S.A.I.D./El Salvador, including briefing and debriefing sessions that will bracket the field work period.

Dr. Donald J. Calvert and the local Crop Protection Specialist will provide reports, manuals and relevant background information to Dr. Charles Ward, Team Leader as indicated in the implementation schedule above. Dr. Ward will provide a rough draft EA including attachments for Mission review at the end of the field work period, and an expanded draft (incorporating Mission input) to Dr. Barfield for CICP review. Dr. Ward will revise the EA as necessary after CICP review. CICP headquarters will be responsible for submitting the final EA to U.S.A.I.D./El Salvador and providing other outputs indicated.

D. PERSONNEL

CICP proposes the services of the following personnel:

Charles R. Ward, Ph.D. Entomologist. A Professor of Entomology at New Mexico State University. Dr. Ward has FS-3 proficiency in Spanish and many years of experience in Latin America with U.S.A.I.D. projects. He has conducted a range of complex environmental assessments and is fully qualified to perform as team leader for this project.

Donald J. Calvert, Ph.D. Entomologist. Dr. Calvert is fluent in Spanish and worked from 1975-1985 as a Crop Protection Specialist for the University of California, Berkeley, helping to manage pest and pesticide management technical assistance provided to U.S.A.I.D. by CICP. He has been an independent consultant since 1985, with assignments including other U.S.A.I.D. EAs as well as long-term supervision of IPM research and extension activities in Bolivia for U.S.A.I.D. and in the Dominica Republic for Chemonics International.

Carl S. Barfield, Ph.D. Entomologist. A Professor of Entomology at the University of Florida and CICP pest management specialist, Dr. Barfield has wide experience with pest and pesticide management in Latin America. He has developed other EAs for CICP and is highly qualified to review the EA document.

A local Crop Protection Specialist is to be provided by AIFLD.

E. FACILITIES

CICP will provide all facilities except office space and office equipment in San Salvador, which will be provided by AIFLD. AIFLD will provide vehicle and travelling expenses for the Crop Protection Specialist they hire as well as vehicle and driver expenses for travel to field sites required by CICP team members. AIFLD will assist the CICP team in making local travel and meeting arrangements required to complete the EA and appendices.

STATEMENT OF WORK

ENVIRONMENTAL ASSESSMENT
AGRONOMIC TECHNICAL ASSISTANCE COMPONENT
EL SALVADOR DEMOCRATIC LABOR DEVELOPMENT PROJECT
(519-0368)

I. OBJECTIVE:

Prepare an Environmental Assessment in accordance with A.I.D environmental regulations (22 CFR Part 216) for the agronomic technical assistance component of the A.I.D. Democratic Labor Development project (519-0368).

II. BACKGROUND:

The subject project consists of a three year, $14.4 million cooperative agreement with the American Institute for Free Labor Development (AIFLD) to provide support for actively promoting the process of democratization through the development of a strong and vigorous democratic labor movement in both urban and rural sectors of El Salvador. The goal of the new project is to consolidate and expand the democratic labor movement. The purpose is to improve the services provided to members by the Union of Workers and Peasants (UNOC) and the Democratic Workers Central (CTD), as well as other democratic trade unions. The project has five main components, which encompass several subactivities. The components are: (1) UNOC, (2) Urban Unions, (3) Rural Unions, (4) administrative support to AIFLD, and (5) the Salvadoran Foundation. Subactivities under these components cover traditional union activities, such as membership drives, organizational strengthening, leadership training, and vocational training. A relatively new subactivity of this project is agronomic technical assistance to increase farm production through development and implementation of simple technical packages including improved seed varieties, agrochemicals, improved low cost cultivation practices, conservation of soils, water management, and optimization of machinery use.

The Initial Environmental Examination (IEE) prepared for the subject project recommended and received a Positive Threshold Decision. As determined by the IEE, subactivities supported under the project include those that may potentially produce adverse environmental impacts. These activities fall in two general categories: (1) economic and social projects including housing, infrastructure repair (roads, bridges, drainage systems, etc.), and water supply and sanitation; and (2) agricultural development projects. Agricultural activities identified as having potentially adverse environmental effects include pest/pesticide management-related technical assistance packages and microenterprise credit programs, including assistance for the establishment of small, cooperative-oriented agrochemical stores.

Because of these concerns, and the Positive Determination for the subject project, an Environmental Assessment (EA) must be carried out pursuant to A.I.D. Environmental Regulations (22 CFR 216). The EA must be preceded by a scoping activity which identifies the main issues to be addressed. This document provides the scope and guidelines for the preparation of an EA for the agronomic technical assistance component of the AIFLD project.

III. PURPOSE OF THE ENVIRONMENTAL ASSESSMENT:

In El Salvador, pesticides are widely applied by small farmers to control actual or perceived agricultural pests. Some of the most common products used, because of availability, low cost, familiarity with the product, or perceived effectiveness, are pesticides in U.S. EPA's Restricted Use (RU) category. A few others are not registered with EPA. Integrated pest management (IPM) and the economic and environmental benefits associated with its adoption remain poorly understood. Accordingly, the purpose of this EA is to:

1. Ensure that future direct or indirect pesticide use activities in the project do not result in adverse impacts on humans or the environment through recommendation of actions that will reduce such risk.

2. Provide guidelines for the development of technical assistance programs for farmers that adequately address pest/pesticide management concerns.

3. Provide guidelines for training AIFLD technical assistance personnel in pest/pesticide management, aimed at developing an adequate level of competence in this area.

4. Provide guidelines for the design and establishment of a system of agrochemical microenterprises under the project, which closely follows GOES and A.I.D. pesticide laws and regulations.

5. To the extent possible, relate recommendations for pest/pesticide management activities under the AIFLD project to USAID/El Salvador actions originating from recommendations provided in the 1988 "Environmental Assessment of Pest Management Practice and Pesticide Use in El Salvador," prepared for USAID/El Salvador by the Consortium for International Crop Protection.

IV. TEAM TASKS AND RESPONSIBILITIES:

The overall purpose of the services described below is to conduct an environmental assessment of agronomic technical assistance component supported under the AIFLD Cooperative Agreement.

Preparation of this EA for the agriculture development project component will include the following tasks:

A. Team Leader:

1. Will be required for 4 weeks, two and a half of which will be spent in country, working with the team members.

2. Will provide guidance, direction, and support to the team members in all aspects of EA development. To the extent practicable, he/she will collaborate with the team members in the fact finding phase of EA development and in the preparation of required guidelines and recommendations.

3. Will be responsible for preparing the draft EA document, following A.I.D. Environmental Procedures, including the guidelines presented in Pesticide Procedures, 22 CFR Part 216.3(b), and for presenting to the Mission's Office of Democratic Initiatives a finalized EA document upon completion of assignment.

4. Will be responsible for reviewing the list of pesticides requested under the project for appropriateness and compliance with A.I.D. pesticide requirements.

5. Will work closely with the USAID project officer and environmental officer and the AIFLD project manager, and will conduct a briefing and debriefing session at the initiation and termination of the assignment, respectively.

B. Crop Protection Specialists (2):

1. Two crop protection specialists will each be required for three weeks, in country, and will be jointly responsible for the following tasks:

2. Assess project target crops relative to pest management needs and pesticide use patterns; assemble a list of the most frequently used pesticides in project implementation sites.

3. Assess project capabilities and constraints in IPM and pesticide management and safety, including personnel considerations, training needs, and readiness to provide adequate technical assistance to farmers and guidelines for agrochemical microenterprises in these areas.

4. Design a pest/pesticide management training strategy and illustrative program for project technical assistance staff.

5. Design a pesticide handling and safety training strategy and illustrative program for individuals who will participate in the project's planned agrochemical microenterprise program.

6. Design strict guidelines and requirements for the transport, storage, packaging, labeling, use, and disposal of pesticides and pesticide containers for incorporation in the project's agrochemical microenterprise program.

7. Design a working monitoring program which can be used by AIFLD and A.I.D. to ensure that the project's planned agrochemical microenterprise program complies with GOES and A.I.D. regulations.

8. Work in close collaboration and consultation with each other, the EA team leader, A.I.D. and AIFLD personnel.

9. Present concise reports to the EA team leader for incorporation of pertinent data into the EA document.

10. Prepare the strategies and guidelines requested in (4) through (7) above, as discrete, concise manuals written in Spanish for future use in project design and implementation; these reports will be included as appendices to the EA document.

V. REPORTING REQUIREMENTS:

Upon completion of assignment, the team leader will be responsible for submitting a draft EA report in English, with pertinent appendices in Spanish (see IV.B.10, above) to USAID/San Salvador's Office of Democratic Initiatives for review. All principal findings and recommendations will be presented in a debriefing session, when the report will be reviewed by Mission staff. Pertinent comments and recommendations made during this session will be incorporated by the team leader in the final EA report, and six (6) copies in English and six (6) copies in Spanish of the EA will be submitted to the Mission no later than one month after the team's departure from San Salvador. The finalized document will be submitted to the A.I.D. Bureau Environmental Officer for final review and approval.

VI. RELATIONSHIPS AND RESPONSIBILITIES:

The contractor will work under the general guidance of the Mission Director and the supervision of the Office of Democratic Initiatives Director or her designee.

VII. LEVEL OF EFFORT:

The team leader will be required for twenty-four (24) work days, fifteen of which will be spent in country, two (2) will be for international travel (from the U.S. to San Salvador and return), and seven (7) will be for preparing for the assignment and finalizing the EA report. The two crop protection specialists will be required for eighteen (18) days each, all of which will be spent in country.

A six day work week is authorized, but no premium pay is authorized.

VIII. EA TEAM COMPOSITION AND EXPERIENCE:

The EA team will be composed of three individuals with the following qualifications:

A. Team Leader

The team leader shall be thoroughly familiar with A.I.D. procedures and projects, including A.I.D. environmental procedures outlined in 22 CFR Part 216. In addition, this individual shall have expertise in EA preparation and writing, knowledge of Spanish at the FSI 3 level or higher, familiarity with Latin America, and a strong background in one of the crop protection disciplines.

B. Crop Protection Specialists (2)

The crop protection specialists shall have in-depth knowledge of pesticide use practices in El Salvador, GOES pesticide laws and regulations, and experience in pest/pesticide management training for extensionists and farmers.

Drafted:AChiri/JWilson:JW:0829L:9/20/90

APPENDIX 2.

ETD and IEE for the AID/ES Democratic Labor Development Project No. 518-0368

AGENCY FOR INTERNATIONAL DEVELOPME...
WASHINGTON, D.C. 20523

LAC-IEE-90-53

ENVIRONMENTAL THRESHOLD DECISION

Project Location	:	El Salvador
Project Title	:	Democratic Labor Development (AIFLD II)
Project Number	:	519-0368
Funding	:	$14.5 million (LOP)
Life of Project	:	3 years
IEE Prepared by	:	Edward Landau Environmental Coordinator USAID/El Salvador
Recommended Threshold Decision	:	Positive Determination
Bureau Threshold Decision	:	Concur with Recommendation
Comments	:	An Environmental Assessment for the Project will be carried out, focusing on activities identified in the IEE and the EA Scoping Exercise that have potentially negative environmental impacts, including construction of potable water and sanitation activities, and support for pesticide procurement and use.
Copy to	:	Henry H. Bassford, Director USAID/El Salvador
Copy to	:	Edward T. Landau, USAID/El Salvador
Copy to	:	Sergio Guzman, USAID/El Salvador
Copy to	:	Mark Silverman, LAC/DR/CEN
Copy to	:	IEE File

John O. Wilson Date SEP -6 1990

John O. Wilson
Deputy Chief Environmental Officer
Bureau for Latin America
and the Caribbean

AGENCY FOR INTERNATIONAL DEVELOPMENT
UNITED STATES OF AMERICA A. I. D. MISSION
TO EL SALVADOR
C/O AMERICAN EMBASSY.
SAN SALVADOR, EL SALVADOR, C. A.

INITIAL ENVIRONMENTAL EXAMINATION

Project Location	:	El Salvador
Project Title	:	AIFLD II
and number	:	519-0368
Funding	:	$14.5 Million (LOP)
Life of Project	:	3 years
IEE Prepared by	:	Edward Landau, Environmental Coordinator USAID/El Salvador
Date Prepared	:	April 25, 1990

Recommendation for Threshold Decision:

The AIFLD program will undertake several wide-ranging activities to reach the goal of strengthening and expanding the democractic labor movement in El Salvador. Included in its social and economic program are activities which may impact on the environment. These activities are infrastructure such as potable water and sanitation projects, and rural development such as the procurement and application of pesticides and other chemical inputs. The Mission, therefore, recommends a positive determination for the foregoing activities. However, given AID/W's and the Mission's wish to sign the Cooperative Agreement in the near term, we propose that language be included into the Agreement prohibiting initiation of the potable water and sanitation, and agricultural inputs activities until the appropriate environmental review system and procedures are established (see accompanying Determination). We further request the assistance of a Bureau or Regional Environmental Officer to accomplish this task.

Henry H. Bassford
Director

5/3/90
Date

I. Project Description

The goal of the project is to consolidate and expand the democratic labor movement. The purpose is to improve the services provided by the Union of Workers and Peasants (UNOC) and the Democratic Workers Center (CTD) through an array of inter related programs.

The Project has four basic components: 1) UNOC, 2) Urban Unions, 3) Rural Unions, and 4) Support to AIFLD.

-1) The objectives of the UNOC Component are: To increase membership; upgrade management, technical and operational capabilities of UNOC; improve the human rights situation; undertake a voter registration program; and upgrade leadership capabilities and analytical skills of UNOC and affiliated offices.

2) The Urban Unions Component has seven subcomponents: a) enhancing collective bargaining techniques; b) developing health and safety programs; c) financing a microenterprise credit program; d) formulating small community-based projects; e) expanding the vocational education program in five new areas; f) upgrading the administrative program, planning and implementation capabilities of the CTD; and g) improving the efficiency of at least six CTD affiliate unions.

-3) The Rural Unions Component includes six subcomponents: a) assisting rural landless families to gain access to land; b) supporting the rights of land reform beneficiaries; c) facilitating integrated technical assistance packages to reform beneficiaries; d) fomenting a micro-enterprise credit program, particularly for women; e) developing social projects activity; and f) upgrading the capabilities of rural unions to provide services; and,

-4) The Support to AIFLD component will finance the costs of managing the program with U.S. and local staff, as well as the procurement of vehicles and other administrative requirements.

II. Environmental Review: Project Review and Environmental Impacts.

The AIFLD proposal presents a program-wide approach in order to strengthen the democratic labor movement. The project will assist the labor unions to improve administration, legal services and collective bargaining techniques. The project will also involve social and economic activities, which mirror those undertaken by the USAID, for the unions to develop with members and to provide incentives for new members to join. Specific activities will include management and financial training, microenterprise credits, health activities, housing, infrastructure, rural development, voter registration, etc.

The majority of activities should have little or no impact on the environment. However, activities related to infrastructure and rural development could affect the environment and natural resource base. The infrastructure activities with potential impacts include access roads, and potable water and sanitation facilities. Given that the access road activity will basically emphasize minor leveling of existing roads, the Mission suggests that this activity receive a negative determination. If AIFLD proposes to go beyond basic leveling and maintenance, additional environmental analysis will be required. The procurement and application of various agricultural inputs, including pesticides and other chemicals, as part of technical assistance packages could also produce unintended negative consequences.

The proposal contains a discussion regarding AIFLD's intention to use appropriate AID environmental procedures during implementation of the project, particularly pertaining to agricultural inputs.

III. Determination

The project will require a systematic way to analyze the potential environmental impacts and to devise procedures for the various risk activities. However, given the breadth and scope of the proposal, as well as the imperative to sign the Agreement as soon as possible, a pre-Agreement Environmental Assessment is not possible. Therefore, in accordance with 22 CFR 216.2(d)(xi), "potable water and sewerage projects...," and 216.3(b), "pesticide procedures" and in lieu of a pre-Agreement environmental assessment, the Mission will incorporate into the Cooperative Agreement language which prohibits initiation of the potable water and sanitation, and rural development activities (pertaining to pesticides and other chemical inputs) until an appropriate environmental analysis system and procedures are established. Relating to potable water and sanititation activities, which will consist of small-scale interventions, the Mission proposes that AIFLD use the criteria established to judge environmental impacts under the Water Supply, Sanitation and Health Component of the Public Services Improvement Project (519-0320). The Mission proposes that a Bureau or Regional Environmental Officer visit El Salvador at the soonest possible date to develop the proposed system and procedures.

1085b

APPENDIX 3.

Copy of the Recommendations Section of the Higgins et al. (1988) EA of Pest Management Practices and Pesticide Use in El Salvador

Consortium for International Crop Protection

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AN ENVIRONMENTAL ASSESSMENT OF PEST MANAGEMENT PRACTICS AND PESTICIDE USE IN EL SALVADOR

Team Composition:

Heriberto Arreaga, Universidad of San Carlos, Guatemala
Filmore Bender, University of Maryland
Mary Louise Higgins, S&T/FENR, A.I.D./W, Team Leader
David Kauck, Tropical Science Center
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Completed under Contract No. DAN-4142-C-00-5122-00 with the Consortium for International Crop Protection (CICP)

January 5, 1989

There is sufficient evidence from the review of literature and from first hand observations of the study team to state, unequivocally, that serious problems exist regarding the misuse, overuse and unsafe handling of pesticides in El Salvador. On average since 1980, more than 1100 poisonings have resulted in hospital visits each year (Chapter III.C.5.). Of these hospital visits, pesticide poisonings are among the top ten causes of mortality. In reality, the number of pesticide poisonings is almost certainly underenumerated because many cases go unreported and many pesticide related illnesses resemble other problems, e.g. respiratory infections. Over the past 10-15 years, residue levels exceeding allowable tolerances for organocholorines and parathion have been found in water, soil, beef, oils, fruits and vegetables, and human tissue. There have also been a substantial number of cases of pesticide related mortality in domestic and wild animals (Chapter III.C.2 and III.C.3).

If no positive action is taken to correct the situation, it is reasonable to conclude that El Salvador will lose export markets because of pesticide residues, that the environment will continue to be contaminated leading to the potential loss of existing industries (e.g. fish and shrimp), and that pesticide intoxications and related human health problems will continue at their current unacceptably high levels. In fact, there is every likelihood that acute intoxications will increase as organochlorine use declines in favor of organophosphates and carbamates, some of which pose a greater direct threat to human health.

If action is to be taken, it must be taken with full recognition of the problems and obstacles that exist to effecting change. These include the following.

1. Pesticide management problems are widespread and pervasive in the Salvadoran context (Chapter III.B.4 and III.C.2). Pesticides are readily available, even to the poorest farmers, and Salvadoran peasants are accustomed to their use.

2. Despite their familiarity with pesticides, El Salvador's small farmers are often woefully misinformed about proper pest control techniques. Overuse of pesticides, application at inappropriate times, disregard of proper safety precautions, and a lack of awareness of alternative methods of pest control are all common. Poverty and illiteracy contribute to pesticide use problems, making it exceedingly difficult to implement safety measures or to introduce alternative methods of pest control.

3. In recent years, the deterioration of the government's agricultural extension system, which was never adequate to meet the demand for technical assistance, has further inhibited the transfer of alternative pest control technologies.

4. The problem of overuse of pesticides is exacerbated by current banking practices which encourage the use of pesticides without ensuring their safe and effective management (Chapter III.C.2). Banking practices contribute to pesticide use in two ways.

   a. Banks commonly offer bland loans for the purchase of pesticides, but not for alternative pest control measures. This practice amounts to a subsidy for pesticide inputs which oftentimes renders alternative pest control strategies noncompetitive.

   b. Secondly, agricultural lending policies typically require that farmers use a designated portion of their loans for pesticide inputs. One bank, the Banco de Fomento, actually distributes pesticides itself as part of its agricultural lending program. Thus, even if alternative pest control measures are competitively priced, small farmers are not free to use credit to purchase that technology.

5. Crop diversification is being promoted without an accompanying base of knowledge about effective pest management in those crops. Thus, pest control depends on prophylactic use of pesticides based on a calendar schedule rather than on actual pest infestation and threat of economic damage (Chapter III.C.4).

There are a whole variety of actions that can be taken by A.I.D. and other donors, that are both practical and feasible, falling into four major categories: policy change, research, training, and extension. The recommendations that follow emphasize these areas but are presented in order of the first five priority actions that can be taken by the Office of Rural Development, USAID/El Salvador. More detailed suggestions are included within the body of the text.

Recommendation 1: Many of the pesticides that are currently in use are considered Class I chemicals, highly toxic to humans and the environment if the appropriate safety measures are not taken. It is highly unadvisable to permit use of such dangerous chemicals under the conditions in which they are being used, (i.e. frequent application and calendar spraying by farmers who lack adequate protective gear and knowledge of appropriate safety practices).

The first action that should be taken is to distribute broadly less toxic, general use chemicals. A list has been prepared with this environmental assessment. The chemicals are all registered for use and available in El Salvador. Cost differences and efficacy will need to be considered. Some of these comparisons are made in Section III.C.4. Adaptive research will be required to test chemical alternatives and to refine the attached list. Farmers are familiar with the use of certain chemicals, and will continue their use unless additional information is made available and alternatives are offered. Alternatives must be equally effective and comparably priced or they will be undersold by the more toxic chemicals (Chapter III.C.4).

Projects should place a high priority on field trials with safer chemicals if their efficacy is in question. Such field trails could be implemented by FUSADES on their demonstration plots, by the Water Management Project and/or by the CENTA/MIP team. Also CENTA does perform efficacy trials for pesticide registration. If resources could be made available (local currency funds), these trials could be incorporated into their existing activities.

This is part of a short term solution until broader scale training can be implemented, safety equipment can be procured, and IPM technologies can be developed and extended. The list attached to the draft document should not be considered completed or approved until the final document is reviewed and approved. This list will require continual updating.

Recommendation 2: Current exchange rate and credit policies make it exceedingly difficult to promote alternative methods of pest control. The current rate of exchange has resulted in an overvalued currency, and hence encourages the importation of agricultural inputs, including pesticides. Furthermore, the Central Bank, which rations scarce dollar reserves to importers, generally treats the importers of agricultural inputs preferentially. It is recognized that changes in the rate of exchange or the Central Bank's scheme of rationing foreign currency will be implemented for reasons that have nothing to do with pesticide use and handling practices. Other actions, however, could serve to compensate for the negative impacts that these policies have on pesticide imports.

USAID/El Salvador may consider working with Defensa Agropecuaria, Economia Agropecuaria, and the Banco Central de Reserva to encourage the cancellation or restriction of the importation and/or sale of highly toxic chemicals. Alternatively, a quota system or tax could be levied on the more toxic chemicals, thus discouraging their importation for general use. The system needed to implement this policy change already is in place. Quotas on imported agricultural inputs are currently set by the BCR and a sliding scale exists for import fees (ranging from 5-30%). Import fees could also be used to directly support safety and monitoring programs, and IPM. A.I.D. could negotiate changes in these quotas and fees as a condition of further economic support funds or local currency agreements.

Recommendation 3: As noted above, Salvadoran banks currently offer bland loans for the purchase of pesticides, but not for alternative pest control measures. This practice amounts to a subsidy for pesticide inputs. In addition, although credit is made available for pesticide purchases (which oftentimes are an obligatory condition of the loan), the banks have shown little interest in providing credit for safety equipment. The contribution to the economy and to national goals of low interest agricultural credit is beyond the scope of this study. However, credit policy changes could be implemented that would foster safer and more effective use of pesticides. This would include the following changes.

1. General use pesticides that are provided through credit programs should be accompanied by safety equipment such as cotton masks, light weight gloves, rubber boots and cotton overalls, i.e. equipment appropriate to

the Salvadoran context. Farmers should be required to procure safety equipment at a favorable price at the time that pesticides are procured and its use will be part of the loan package. Both the commercial banks and Banco de Fomento have a relatively large staff of agents that regularly visit farmers to monitor their loan portfolio. Loan officers could monitor compliance with this component of the loan during site visits, by reviewing former practices and use of safety equipment and types of pesticides.

2. In order to accomplish the previous recommendation, it will be necessary to familiarize loan officers in Salvadoran banks with alternative pest control technologies.

   Short courses should also be offered to acting loan officers. Project 0307 (Agrarian Reform Financing) currently is providing training for loan officers through the BCR. It seems likely that short courses on pest control and safe pesticide handling could be integrated into this program at a nominal cost. An illustrative budget is included as Attachment 4. Such a training program should have a monitoring and evaluation component built into it. CICP, under the S&T/AGR project, has developed training materials and conducted similar training courses in other parts of Latin America and the Caribbean.

3. As a result of this training, loan officers should include information on health risks and costs as part of the project risk/benefit analysis conducted for loan requests and when reviewing farm plans. Safe use means a healthier farmer who can more likely pay back on his loan. This training for loan officers, many of whom are agronomists, could be implemented through the contract with Arizona State in the Agrarian Reform Financing Project, as noted above.

4. As long as loans for agricultural inputs are going to be offered on concessionary terms, credit should be made available on terms that are at least as advantageous for biological and mechanical control measures as they are for pesticides.

Recommendation 4. Ultimately decreased pesticide use will require alternatives and options and the development of IPM technologies. IPM should be an explicit component of all future agricultural development projects, including A.I.D. projects, in El Salvador. Pests, and thus pest management, are part and parcel of agricultural production systems. Addressing this problem up front may avoid or at least minimize problems with pesticide use down the road. While a lot can be done with local currency, dollar resources would strengthen activities by providing timely access to necessary technical assistance. IPM should focus on extension where technologies exist and on research where research is needed. Where research is needed, it should be adaptive in nature and designed, developed and implemented with the participation of extensionists and growers. Building national capabilities is the key.

IPM in Nontraditional Exports

IPM Research in nontraditional crops needs to be expanded. FUSADES should support more research activities in IPM through a long-term advisor to coordinate and integrate IPM into their variety trials. Priority areas for research should include some of the following.

1. Resistant crop varieties to virus and fungus infection, development of which is likely to be done at the regional level through any one of the regional agricultural research centers (e.g. CATIE). Research in El Salvador on resistant varieties is likely to be primarily adaptive in nature.

2. Vector biology and control. Vector management is critical in some of the nontraditional crops to reduce disease transmission. Cultural practices and plant resistance, in addition to vector biology and ecology, will be key components of this research.

3. Sampling and monitoring techniques and determination of economic thresholds should be developed to enable moving beyond calendar schedules for the application of pesticides.

4. Development of cultural practices including rotations and intercropping techniques to control pests and diseases.

5. Diagnostics for pests and natural enemies in nontraditional crops.

IPM for Small Farmers

IPM technologies for small farmers will need to have somewhat of a different focus. Emphasis should be placed on IPM in mixed cropping systems and most importantly, on the design of sampling techniques and decision tools that can be used by farmers. The CATIE/MIP team, in coordination with the GTZ project, should look at these issues in determining research priorities. A farming systems approach perhaps will be far more effective for small farmers than a single crop focus. IPM Research for small farmers could develop needed technology for pest management in import substitution crops which are likely to be more manageable for small farmers than will be export crops.

It is recommended that a series of IPM agronomists be hired to work on horticultural crops. Regional IPM centers, which would be comprised of the agronomists and demonstration plots, would undertake research in selected crops. Agronomists would receive training from CENTA and FUSADES specialists, similar to the training now being provided under the Water Management Project. These agronomists could then train other extentionists and farmers through a series of workshops in IPM techniques. Simple issues such as early identification of pests and diseases and the presence of natural enemies could help to reduce pesticide use.

Finally, resources for research are slim in El Salvador. Interest in developing a private research foundation may have certain merits given the current problems with the flow of resources in the government. On the other hand, it could also further cripple what little is being done in the public sector. It is recommended that a research foundation, if established, be used to, in part, promote research to meet the needs of nontraditional crop development while also supporting the focus of the public sector, i.e. to work with smaller growers and IPM in mixed cropping systems. It is strongly recommended that IPM research be a clear priority to be supported by the foundation. This mechanism should be used to identify key pest problems and research needs to implement IPM programs in nontraditional export crops.

Public sector research could be complemented by establishing a research grants program in the foundation which would be accessible to both the private and public sector. The foundation could also offer research fellowships to university students who are already working with CENTA in the labs and the field. CENTA staff also serve as advisors to students at the various universities. Procurement of resources for the public sector could be done by the foundation, thus avoiding difficulties with the flow of resources.

Recommendation 5: Training in safe pesticide use and alternative pest management techniques, where available should be a part of every agricultural project in El Salvador. This emphasis should be increased in all projects. Listed below are some possible mechanisms to target training needs.

1. Safety training could be provided to bank loan officers as described above, to cooperatives through technical assistance firms working with cooperatives and as part of the phase III land titling. Some support may be provided to APA to provide training to distributors. APA training however, should be expanded to consider proper management of pesticides (e.g. timing and frequency) in addition to safety. Support to APA should be conditioned on developing the short courses in collaboration with an IPM specialist.

2. The support for curriculum development being provided through the Water Management Project and the TA in crop protection is excellent. It is strongly recommended that some of the basic courses for agronomy students be strengthened through this irrigation specialization with the support of the CENTA Control Integrada de Plagas. Another option might be to invite agronomy students to the specialized courses in crop protection as an elective, thereby taking advantage of the strengthened courses. Assistance in teaching and curriculum design may be available from some of the ecologists and agronomists teaching in the universities. These professors could consult on design thereby enabling use of local currencies for technical assistance.

3. IPM should be strengthened as a component of the curriculum at the Escuela Nacional de Agricultura (ENA). The agronomo program should also strengthen its training in ecology and IPM. Ecology courses should focus on agricultural systems, thus providing a background in

ecology that applies directly to the management of agricultural systems. An illustrative curriculum is included as Attachment 5 to the EA.

There is an important need to increase the collaboration and cooperation between ENA and CENTA particularly in the area of crop protection. CENTA has considerably more resources than ENA in terms of labs and library and CENTA could incorporate ENA students into the field research and provide practical experience in experimental methodology for ENA students. Agronomos need to develop a stronger set of tools for problem-solving and assessments (e.g. Rapid Rural Appraisal and Agroecosystems Analysis). Methodology courses could be strengthened. Finally, in many of the courses, there should be greater emphasis on field exercises, particularly within existing entomology and ecology courses. The ENA and CENTA administrations should consider this issue for increased collaboration.

4. Changing the minds of policy-makers is a critical step in effecting institutional changes. A short course for policy makers in GOES, USAID/El Salvador, and those private sector firms involved in the agriculture sector should be developed. The course should be at least two days long and present information regarding current practices and their environmental, economic and human health consequences, including information on alternative pest management strategies, including IPM. The bulk of the course will be spent in the field learning firsthand about the problems posed by pesticide misuse. The S&T/FENR Environmental Planning and Management (EPM) project is exploring possible collaboration with the Organization for Tropical Studies (OTS) in Costa Rica to provide environment and natural resources training for policy makers and NGOs. Action may be possible through this project.

5. CATIE/MIP: Continued support should be given to the CATIE/MIP project. There should be greater emphasis on extension where IPM technologies have been developed. Coordination between GTZ and MIP is critical. Both of their efforts are oriented towards small farmers. This should continue. CATIE/MIP may however focus more on import substitution crops. Emphasis should be placed on developing IPM techniques for small farmers in a farming systems context through applied and adaptive research, working directly with farmers in the development of technologies more so than has been done in the past. MIP, with A.I.D. assistance, should endeavor to increase its linkages with extension and the Gerentes Regionales to garner their support and allegiance.

The above outlined recommendations are considered priorities in terms of the overall impact they may have in directly addressing the pesticide use and pest management problems in El Salvador. Other options should be explored. These target other sectors and attempt to facilitate coordination between the public and private sectors.

Public Health Training and Information Needs

1. A series of training seminars on the proper treatment of intoxications should be offered to health professionals through the Ministerio de Salud. This in fact could be conducted as part of a planned emergency health care training course under the Health Sector Support Project in the Office of Health. The Office of Rural Development should follow up with the health office on this opportunity.

2. Current recommendations on the treatment of different types of intoxications should be compiled, published and distributed to all of the nation's hospitals and clinics. Within those facilities, that information should be easily accessible and prominently displayed.

3. Technical assistance should be given to the Ministry of Health so that health extensionists and rural clinics can provide short courses in safe pesticide handling and first aid in the case of intoxications. At the earliest possible date, pesticide intoxications should become part of the training activities offered to the rural health promoters program. These individuals are widespread and apparently well respected within their community. Again this would require coordination between the health and rural development offices of USAID/El Salvador, but the programs of the Office of Health offers a possible vehicle for implementation.

4. In order to close the data gap, the Ministry of Health should be encouraged to establish a national registry of intoxications. Such a registry should include information on the type of intoxicant, the circumstances of the intoxication, and the socioeconomic characteristics of the victim. Surveys should be administered to the victims by health professionals as part of the treatment process. The training seminars mentioned above would be an appropriate opportunity to distribute questionnaires to health professionals and to train them in interview techniques. A sample questionnaire and protocol is included as Attachment 6 to the EA.

It is important for all of the training activities described above that a monitoring, evaluation and followup component be included. Follow-up visits should be made to evaluate the impact of the training in terms of behavioral and attitudinal changes.

Coordination among sectors is critical. It is recommended that training programs incorporate the participation of health and agriculture professionals and the staff from both ministries. Not only is this important to minimize conflicts between the use of pesticides in public health and agriculture, but activities in both ministries could serve to mutually reinforce one another.

While the team did not have time to explore general educational issues and public awareness, the Office of Rural Development should examine opportunities to support environmental education with local NGOs and the use of radio public service announcements. The Office of Education is

developing a new rural radio program which may present a potential vehicle. It is recommended that the Office of Rural Development explore this possibility. S&T/Education has assisted USAID/Bolivia in a similar effort. Their communications project may be available to provide T.A. in the design of a pesticide safety program for radio.

Illiteracy is a serious impediment to safe use of pesticides. With illiteracy rates as high as 70% in the rural population, current labeling and packaging information is inadequate. APA and Defensa Agropecuaria should endeavor to develop more effective labeling for the illiterate portion of the population (e.g. pictograms in addition to color coding). This may be an appropriate area of collaboration between the USAID/El Salvador Offices of Rural Development and Education.

Data and Monitoring

Availability of data and information is patchy and results largely from specific studies. There is little, if any, continual monitoring of environmental, health and economic impacts of pesticide use. Lack of resources largely limits these activities. Monitoring programs should be put in place and supported in four general areas.

1. Environmental monitoring on impact of pesticides on nontargets (e.g. natural enemies, estuaries and avifauna) and environmental contamination (water and soil) due to pesticide use (i.e. monitoring residue levels). Future focus might be placed on fungicides and metal contamination, where fungicides are increasing in use, and on sensitive areas, both economically (e.g. fisheries) and ecologically (e.g. coastal zones).

2. Human health impacts should be monitored as described above. There is also a need to monitor and evaluate chronic poisoning through acetylcholinesterase (AcCh) levels to identify problem areas and to establish norms for AcCh activity for rural populations. Where sampling has been conducted, levels were depressed in about 40-45% of the population sampled. The norm for these populations and the interaction between the depression of AcCh and health status are unclear.

3. Residue levels on foodstuffs in the domestic market. CENTA and Defensa Agropecuaria have identified the budget needs to begin a monitoring program for vegetables in the domestic market (Attachment 7). Assistance could be provided to CENTA as part of existing A.I.D. projects. Resources should be provided in kind for reagents and equipment to avoid complex GOES procurement procedures. In addition, this type of support may fit into some of the IDB supported programs to build laboratory capabilities, at least in terms of the support for infrastructural development.

There is interest coming from many directions to develop a database of pesticides, pests, and crops. This could be a very helpful source of information to keep institutions abreast of changes in the status of

chemicals, to acquire information on alternatives and management options. Such a database would most appropriately be housed at Defensa Agropecuaria, CENTA and FUSADES. This should however, be a regional effort coordinated by ROCAP to assure uniformity and compatibility among systems, allow for periodic updates of information, and to capitalize on the work going on in the region. The database being developed by CABEI on the current software system (LOTUS) is a bit unwieldy. To begin, this should be reviewed as part of the data management activities soon to get underway in the Water Management Project. CABEI may also be available to provide guidance in developing a database. FUSADES should also support this effort and be closely involved since they appear to have far greater computer facilities at their disposal than does CENTA. This database would include guidance on use of pesticides, guidance on interventions (timing, economic thresholds, etc.) and cost implications of alternative pesticides. Information to be covered is included as Attachment 8.

APPENDIX 4.

Lists of Endangered Animal and Plant Species Known in El Salvador

CUADRO A

EL SALVADOR

ARBOLES EN PELIGRO DE EXTINCION

NOMBRE COMUN	NOMBRE TECNICO	FAMILIA	ESTADO ACTUAL
	Guatteria anomala R.E. FRIES	ANNONACEAE	No visto últimamente (1) (2)
Jaibillo, candelo, molleja de pato.	*Aspidosperma megalocarpon* MUELL. ARG.	APOCYNACEAE	Endémico en El Imposible-San Benito(4)
Mano de leon de panayo	*Oreopanax lachnocephalus* STANDL.	ARALIACEAE	Endémico en Montecristo (4)
Chilca	*Astianthus viminalis* (HBK) BAILL.	BIGNONIACEAE	No visto últimamente en estado natural (2)
Repollo	*Capparis calciphila* STANDL. & STEYERM.	CAPPARIDACEAE	Endémico en El Imposible San Benito (4)
Palo de pólvora	*Capparis tuerckheimii* D. SMITH	CAPPARIDACEAE	Endémico en El Imposible San Benito (4)
	Viburnum mortonianum STANDL. & STEYERM.	CAPRIFOLIACEAE	No visto últimamente (1) (2)
Lupita	*Wimmeria cyclocarpa* RADLK.	CELASTRACEAE	Endémico en el Depto. de San Salvador (1) (3)
Escobo blanco	*Maytenus chiapensis* LUND.	CELASTRACEAE	Endémico en El Imposible-San Benito (4)
Pata de palomo	*Quetzalia reynae* LUND.	CELASTRACEAE	Endémico en Montecristo (4)
	Eupatorium ruae STANDL.	COMPOSITAE	Endémico en Morazán, no visto últimamente (1)
Malacate	*Weinmania balbisiana* HBK	CUNONIACEAE	Endémico en Montecristo (4)
Cacahuillo, cashulahuácate	*Dichapetalum donnell-smithii* ENGL. *var. donnell-smithii.*	DICHAPETALACEAE	Endémico en El Imposible-San Benito (4)
	Diospyros nicaraguensis (STANDL.) STANDL.	EDENACEAE	Endémico en Ahuachapán (3)
Manune, manune rojo	*Cordia collococca L.*	EHRETIACEAE	Endémico en Parque Deininger (4)
	Cordia salvadorensis STANDL.	EHRETIACEAE	Endémico en San Salvador, no visto últimamente (2)
Jocotillo	*Phyllanthus acuminatus* VAHL.	EUPHORBIACEAE	No visto últimamente en estado natural (2)
	Quercus esesmilensis TUCKER & MULLER.	FAGACEAE	Endémico en Chalatenango, no visto últimamente (2)
Ujushte	*Matudae trinervia* LUND.	HAMAMELIDACEAE	Endémico en Montecristo (4)
Aguacate de macho	*Beilschmiedea mexicana* (MEZ) KOSTERM.	LAURACEAE	Endémico en Montecristo (4)
Quebracho	*Acacia centralis* (BRITT. & ROSE) LUNDELL.	LEGUMINOSAE – MIMOSOIDEAE.	Endémico en San Salvador, no visto últimamente (1) (2)

CONTINUACION CUADRO A

NOMBRE COMUN	NOMBRE TECNICO	FAMILIA	ESTADO ACTUAL
Hormiguillo rojo	*Leucaena shannonil* D. SM.	LEGUMINOSAE – MIMOSOIDEAE	Endémico en El Imposible-San Benito (4)
	Lysiloma multifoliolatum BRITT. & ROSE.	LEGUMINOSAE – MIMOSOIDEAE	Endémico en el Depto. de Usulután y La Paz (Zacatecoluca) (2)
	Mimosa platycarpa BENTH.	LEGUMINOSAE – MIMOSOIDEAE	No visto últimamente (1) (2)
Brasil	*Haematoxylon brasiletto* KARSTEN	LEGUMINOSAE – MIMOSOIDEAE	Endémico en Usulután, no visto últimamente (3)
Funera	*Dalbergia funera* STANDL.	LEGUMINOSAE – PAPILIONOIDEAE	Endémico en el Depto. de Chalatenango y Santa Ana (1) (3)
	Gliricidia guatemalensis MICHELI	LEGUMINOSAE – PAPILIONOIDEAE	Endémico en el Depto. de Santa Ana (1) (2)
Chaperno	*Lonchocarpus michelianus* PITTIER	LEGUMINOSAE – PAPILIONOIDEAE	Endémico en el Depto. de Sonsonate (2)
Pito	*Ormosia macrocalyx* DUCKE	LEGUMINOSAE – PAPILIONOIDEAE	Endémico en el Depto. de San Miguel (2)
	Platymiscium pleiostachyum D. SM.	LEGUMINOSAE – PAPILIONOIDEAE	Endémico en el Depto. de Santa Ana (3)
	Hampea stipitata S. WATSON	MALVACEAE	Endémico en el Imposible (4)
Majagua	*Hampea reynae* FRYXELL	MALVACEAE	Endémico en Montecristo (4)
	Hampea stipitata S. WATSON	MALVACEAE	Endémico en El Imposible (4)
Mozotón	*Robinsonella speciosa* FRYXELL	MALVACEAE	Endémico en Montecristo (4)
	Miconia prasina (SW.) DC. var crispula (SPRUCE) COGN.	MELASTOMACEAE	Endémico en el Depto. de Chalatenango (2)
Cirín-árbol	*Conostegia icosandra* L. DC.	MELASTOMATACEAE	Endémico en Montecristo (4)
Cedro	*Cedrela tonduzii* C. DC.	MELIACEAE	Endémico en Montecristo (4)
Amate	*Ficus morazaniana* W. BURGER	MORACEAE	Endémico en la Barra de Santiago (2)
	Ficus rensoniana STANDL. & CALDERON	MORACEAE	Endémico en Depto. de San Salvador (2)
	Parathesis acuminata LUNDELL	MYRSINACEAE	Endémico en el Depto. de Chalatenango (2)
Amarante silvestre	*Parathesis congesta* LUND.	MYRSINACEAE	Endémico en Chalatenango (2)
Cerezo	*Synardisia renosa* (MAST.) LUND.	MYRSINACEAE	Endémico en Montecristo (4)
	Eugenia pachychiamys D. SM.	MYRTACEAE	Endémico en el Depto. de Chalatenango (1) (2)
Siete camisas	*Guapira witsbergeri* LUND.	NYCTAGINACEAE	Endémico en El Imposible-San Benito (4)

CONTINUACION CUADRO A

Nombre Común	NOMBRE TECNICO	FAMILIA	ESTADO ACTUAL
	Pisonia donnell-smithii HEIM, ex STANDL.	NYCTAGINACEAE	Endémico en el Depto. de Ahuachapán (1)
Guayabillo	*Hauya ruacophila* D. SM. & ROSE	ONAGRACEAE	Endémico en Montecristo (4)
Ciprés silvestre	*Agonanda racemosa* (DC.) STANDL.	OPILIACEAE	Endémico en El Imposible-San Benito (4)
Palma de sombrero	*Erythea salvadorensis* (WENDL. ex BECARI).	PALMAE	Endémico en Conchagua (3)
Brasil	*Bocconia glaucifolia* HUTCH	PAPAVERACEAE	Endémico en Montecristo (4)
Pinabete	*Abies guatamalensis* REHDER	PINACEAE	Endémico en Depto. de Chalatenango (1) (2) (3)
	Colubrina glomerata (BENTH.) HEMSL.	RHAMNACEAE	Endémico en el Depto. de La Unión (2)
Hoja de cohete	*Cosmibuena matudae* (STANDL.) L.D.	RUBIACEAE	Endémico en Montecristo (4)
Quina	*Exostema caribaeum* (Jacq.) ROEM. & SCHULT.	RUBIACEAE	Endémico en Parque Deininger (3)
Quina	*Exostema mexicanum* GRAY	RUBIACEAE	Endémico en El Imposible-San Benito (4)
Limpiadientes	*Simira calderoniana* (STANDL.) STEYERM.	RUBIACEAE	Endémico en El Imposible-San Benito (4)
Roldán	*Amyris elemifera* L.	RUTACEAE	Endémico en El Imposible-San Benito (4)
Matasanillo	*Esembeckia litoralis* D. SM.	RUTACEAE	Endémico en Parque Deininger (4)
Pochote de tierra fría	*Xanthoxylum aguilarii* STANDL. & STEYERM.	RUTACEAE	Endémico en el Depto. de Ahuachapán (1) (2)
Cuiliote	*Exothea paniculata* (JUSS). RADLK.	SAPINDACEAE	Endémico en El Imposible San Benito (4)
	Thounia acuminata WATSON	SAPINDACEAE	Endémico en Depto. de Santa Ana (2)
Hormigo	*Eumelia celastrina* HBK.	SAPOTACEAE	Endémico en la Barra de Santiago (2)
Sapote injerto	*Pouteria viridis* (PITT) CRONQ.	SAPOTACEAE	Endémico en el Imposible-San Benito (4)
	Taxus globosa L.	TAXACEAE	Endémico en Depto. de Chalatenango (2) (3)
Mescal	*Chaetoptelea mexicana* LIEBM.	ULMACEAE	Endémico en Volcán de San Salvador (3) (4)
Guayacán	*Guaiacum sanctum* L.	ZYGOPHILLACEAE	No visto últimamente en estado natural (2) (3)

FUENTE: Reyna de Aguilar (Com. pers. 1982)

CUADRO B

EL SALVADOR. ORQUIDEAS EN PELIGRO DE EXTINCION

NOMBRE CIENTIFICO Y AUTORIDAD	ESTADO ACTUAL
Amparoa costaricensis SCHLTR.	Endémica en Volcán de San Vicente.
Arpophyllum alpinum LINDL.	Endémica en Perquín
Beadlea comosa (RCHB. f.) HAM. & GARAY.	Endémica en el Volcán de San Salvador.
Beadlea prasophyllum (RCHB. f.) HAMER & GARAY.	Endémica en el Volcán de San Salvador .
Cattleya skinneri BATEM.	Una de las especies más codiciadas y ya escasa.
Corallorhiza odontorhiza (WILLD.) NUTT.	Endémica en Conchagua.
Corallorhiza williamsii CORRELL	Endémica en el Cerro Verde.
Dichaea neglecta SCHLTR.	Endémica en Perquín.
Dryadella simula (RCHB f.) LUER	Endémica en Perquín.
Epidendrum cardiochilum L. D. WMS.	Aunque es de distribución amplia, ya escasa.
Epidendrum comayaguense AMES	Endémica en el Volcán de San Vicente.
Epidendrum cordigerum (HBK) FOLDATS	De amplia distribución, muy perseguida por coleccionistas.
Epidendrum dickinsonianum WITHNER	Endémica en Perquín.
Epidendrum eximiun L. D. WMS.	De amplia distribución, pero ya escasa.
Epidendrum limbatum LINDL.	Endémica en Perquín.
Epidendrum nagelii L. D. WMS	De amplia distribución, pero ya escasa.
Epidendrum polychromum HAGSATER	Endémica en el Cerro Montecristo.
Epidendrum santaclarense AMES	De amplia distribución, pero ya escasa.
Epidendrum urostachyum SCHLTR.	De amplia distribución, pero ya escasa.
Epidendrum vitellinum RCHB. f.	De amplia distribución, pero ya escasa.
Epidendrum virgatum LINDL	Endémica en Perquín.
Habenaria distans GRISEB.	Endémica en el Volcán de San Salvador.
Habenaria hondurensis AMES	Endémica en Perquín .
Habenaria jaliscana S. WTS.	Endémica en La Palma.
Helleriella nicaraguensis HAWK.	De amplia distribución, ya escasa.
Isochilus alatus SCHLTR.	Endémica en el Cerro Montecristo.
Isochilus latibracteatus A. RICH. & GAL.	Endémica en el Volcán de San Vicente.
Isochilus pitalensis HAM. & GARAY	Endémica en El Pital.
Jacquiniella equitantifolia (AMES) DRESSLER.	Endémica en el Volcán de San Salvador.
Lacaena bicolor LIND.	Endémica en Cacaguatique.
Lacaena spectabilis (KLOTZ.) REICHB.f.	Endémica en Morazán y muy escasa.
Lepanthes costaricensis SCHLTR.	Endémica en Perquín Sabanetas
Lephanthes samacensis AMES	Endémica en Perquín.
Lephanthes yunckeri AMES	Endémica en Perquín. Sabanetas.
Liparis wendlandii RCHB. f.	Endémica en el Volcán de San Salvador.
Lycaste suaveolens SUMM.	Endémica en Cacaguatique.
Lycaste sulfurea RCHB. f.	Endémica en la Laguna de Alegría
Lycaste virginalis (SCHDW.) LIND.	De amplia distribución, pero ya muy escasa.
Maxillaria a trata RCHB.f.	Endémica en El Pital.
Mormodes salvadorensis HAM. & GARAY.	De amplia distribución, pero ya muy escasa.
Nageliella angustifolia (BOOTH ex LINDL) AMES & CORRELL.	Endémica en El Pital.
Notylia bicolor LINDL.	Endémica en el Cerro Grande de Apaneca.

CONTINUACION CUADRO B

NOMBRE CIENTIFICO Y AUTORIDAD	ESTADO ACTUAL	NOMBRE CIENTIFICO Y AUTORIDAD	ESTADO ACTUAL
Odontoglossum pauciflorum L. O. WMS	Endémica en Perquín.	*Platythelys vaginata* (HOOK.) GARAY	Endémica en el Cerro El Pilón, Santa Ana.
Oncidium aurisasinorum STANDL. & L.O. WMS.	Endémica en Perquín.	*Pleurothalis segoviensis* RCHB. f.	Endémica en el Peñón de Cayaguanca.
Oncidium crista-galli RCHB. f.	De amplia distribución, pero ya escasa.	*Sobralia macra* SCHLTR.	Endémica en Tacuba.
Oncidium liebmannii RCHB. f.	Endémico en el Cerro El Chino	*Sobralia macrantha* var. kienastiana RCHB.f.	Endémica en el Volcán de San Salvador.
Oncidium sawyeri L. O. WMS.	Endémico en el Volcán Chingo.	*Sobralia xantholeuca* HORT. ex WMS.	Endémica y muy escasa en el Cerro de Montecristo.
Pelexia funckiana (RICH. & GAL.) SCHLTR.	Endémica en el Volcán de San Salvador.		

CUADRO C

BROMELIAS EN PELIGRO DE EXTINCION EN EL SALVADOR

NOMBRE COMUN	NOMBRE TECNICO	ESTADO ACTUAL
Pita floja	*Aechmea magdalenae*	Epífita, Endémica en Cuscatlán
_____	*Bilbergia mexicana*	Epífita, Endémica en Santa Ana
Piñuelón	*Lindmania micrantha*	Terrestre, Endémica en Chalatenango
_____	*Pitcaernia calderonii*	Terrestre, Endémica en Sonsonate
_____	*Pitcaernia ringens*	Terrestre, Endémica en Sonsonate
Pie de gallo	*Tillandsia ionantha*	Epífita, Endémica en Santa Ana
_____	*Tillandsia polystachya*	Epífita, Endémica en La Libertad
_____	*Tillandsia seleriana*	Epífita, Endémica en Santa Ana
TOTAL: 8 spp.		

FUENTE Reyna de Aguilar, com. pers.

CUADRO D

VERTEBRADOS DE EL SALVADOR EN PELIGRO O AMENAZADOS DE EXTINCION

No.	NOMBRE CIENTIFICO	NOMBRE COMUN	Estado de Población
PECES DE AGUA DULCE			
1	*Lepisosteus tropicus*	Machorra, pez lagarto	P
2	*Heterandria sp*	Chimbolo	A
3	*Profundulus punctatus*	Chimbolo	A
4	*Cichlasoma motaguense*	Pando	P
5	*Agonostomus monticola*	Tepemechin	A
ANFIBIOS			
6	*Bolitoglossa sp*	Salamandra pintada	P
7	*Rhinophrynus dorsalis*	Sapo de hule	P
8	*Engystomops pustulosus*	Rana	A
REPTILES			
9	*Caiman crocodilus*	Caimán	P
10	*Crocodylus acutus*	Cocodrilo	P
11	*Staurotypus salvinii*	Tortuga, chamarro	P
12	*Chelonia mydas*	Tortuga verde	A
13	*Eretmochelys imbricata*	Tortuga carey	P
14	*Lepidochelys olivaceae*	Tortuga golfina	A
15	*Dermochelys coriacea*	Tortuga Baule o laud	P
16	*Coleonyx mitratus*	.....	A
17	*Lepidophyma flavimaculatum*	Gecko	A
18	*Corythophanes percarinatus*	Falso tenguereche	P
19	*Ctenosaura similis*	Garrobo	A
20	*Iguana iguana*	Iguana	P
21	*Mabuya mabouya*	Lagartija	A (?)
22	*Cnemidophorus motaguae*	Lagartija	A
23	*Gerrhonotus moreleti*	Lagartija de pliegue	P
24	*Boa constrictor*	Masacuata, boa	A
25	*Loxocemus bicolor*	Masacuata de hule	P (?)
26	*Oxybelis fulgidus*	Vejuquilla verde	P
27	*Lampropeltis doliata*	Falso coral,	A
28	*Ankistrodon bilineatus*	Víbora castellana, cantil	P
29	*Crotalus durissus*	Cascabel	A
AVES			
30	*Pelecanus occidentalis*	Pelícano (café)	A
31	*Phalscrocorax olivaceus*	Pato chancho	P
32	*Anhinga anhinga*	Pato aguja	P
33	*Ardea bercdias*	Gran garza azul	P
34	*Ixocrychus exilis*	Tigrina	P (?)
35	*Mycteria americana*	Sargento	P
36	*Jabiru mycteria*	Jabirú	E
37	*Eudocimus albus*	Ibis blanco, Coco	A
38	*Ajaia ajaja*	Garza morena, rosada o cuchara	P
39	*Cairina moschata*	Pato real	P

Continuación Cuadro D

No.	NOMBRE CIENTIFICO	NOMBRE COMUN	Estado de Población
40	*Oxyura dominica*	Pato enmascarado	P
41	*Sarcoramphus papa*	Rey zope	P
42	*Leptodon cayenensis*	Milano	A
43	*Chondrohierax uncinatus*	Milano	E (?)
44	*Harpagus bidentatus*	Milano	P
45	*Ictinea plumbea*	Milano	A
46	*Accipiter erythronemius*	Halcón	A
47	*Leucopternis albicollis*	Gavilán blanco	P
48	*Buteo albicaudatus*	Gavilán cola blanca	E (?)
49	*B. albonotatus*	Gavilán	A
50	*B. jamaicensis*	Gavilán cola roja	A
51	*Parabuteo unicinctus*	Gavilán pintado	P
52	*Buteogallus a. anthracinus*	Gavilán negro, cangrejero	P
53	*B. anthracinus subtilis*	Gavilán negro, pantanero	A
54	*Busarellus nigricollis*	Gavilán pescador de collar	E (?)
55	*Spizaetus tyrannus*	Aguila crestada negra	P
56	*Spizaetus ornatus*	Aguila crestada real	E
57	*Geranospiza caerulescens*	Gavilán	A
58	*Pandion haliaetus*	Gavilán osífrago, pescador	P
59	*Micrastur semitorquatus*	Guas	A
60	*M. ruficollis*	Halconcilla	P
61	*Caracara plancus*	Querque, quebrantahuezo	A
62	*Falco rufigularis*	Halconcillo	P
63	*Crax rubra*	Pajuil	P
64	*Penelope purpurascens*	Pava	P
65	*Penelopina n. nigra*	Chacha negra. (volcanes)	E (?)
66	*Penelopina nigra dickeyi*	Chacha negra (cordillera)	P
67	*Aramus guarauna*	----------	E (?)
68	*Pardirallus maculatus*	Rálido blanco y negro	P
69	*Aramides cajanea*	Rálido	A
70	*Porzana flaviventer*	Rálido	P
71	*Burhinus bistriatus*	Peretete	A
72	*Claravis pretiosa*	Tortolita azul	P
73	*C. mondetoura*	Tortolita puñalada	P
74	*Geotrygon montana*	Paloma montañera, bufadora	P
75	*G. albifascies*	Paloma montañera cara blanca	A
76	*Ara macao*	Guara, guacamaya escarlata	E
77	*Aratinga holochlora strenua*	Pericón	A
78	*Aratinga holochlora rubritorquis*	Pericón garganta roja	P
79	*Aratinga canicularis*	Catalnica	A
80	*Brotogeris jugularis*	Chocoyo	A
81	*Amazona albifrons*	Cotorra	P
82	*A. ochrocephala*	Lora	P
83	*Bubo virginianus*	Buho barba blanca	P
84	*Pulsatrix perspicillata*	Buho de anteojos	A
85	*Ciccaba nigrolineata*	Buho blanco y negro	P

Continuación Cuadro D

No.	NOMBRE CIENTIFICO	NOMBRE COMUN	Estado de Población
86	*Caprimulgus vociferus vermiculatus*	----------	A
87	*Campilopterus hemileucurus*	Gran colibrí azul	A
88	*Anthracothorax prevostii*	Colibrí (mango) verde	A
89	*Hylocharis eliae*	Colibrí cola dorada	P
90	*Amazilia cyanura*	Colibrí de cola azul	P
91	*Eugenes fulgens*	Colibrí de Rivoli	A
92	*Heliomaster constantii*	Colibrí pico largo	P
93	*H. longirostris*	Colibrí pico largo	P
94	*Doricha enicura*	Colibrí tijereta	P
95	*Pharomachrus mocinno*	Quetzal	P
96	*Trogon mexicanus*	Coa, Coba	P
97	*Trogon collaris*	Coba de collar	P
98	*Megaceryle alcyon*	Martín pescador azul	A
99	*Chloroceryle amazona*	Martín pescador del amazonas	E (?)
100	*Aspatha gularis*	Talapo montañero	A
101	*Notharchus macrorhynchus*	----------	E (?)
102	*Aulacorynchus prasinus volcanius*	Tucán verde de San Miguel	P
103	*Pteroglossus torquatus*	Pico de navaja	A
104	*Piculus rubiginosus*	Carpintero café	P
105	*Dryocopus lineatus*	Montañero	A
106	*Dendrocopus villosus*	Carpintero moteado	P
107	*Phloeoceastes guatemalensis*	Montañero, pico de marfil	P
MAMIFEROS			
108	*Marmosa mexicana*	Tacuazín murine	A
109	*Chironectes panamensis*	Tacuazín de agua	P
110	*Ateles geoffroyi*	Mono araña	P
111	*Myrmecophaga tridactyla*	Gran oso hormiguero	E
112	*Tamandua tridactyla*	Tamandua, oso colmenero	P
113	*Cyclopes didactylus*	Hormiguero lanudo	P (?)
114	*Nasua narica*	Pezote	A
115	*Jentinkia sumichrasti*	Cuyo	A
116	*Eira barbara*	Perico ligero	P
117	*Spilogale putorius*	Zorrillo lomo blanco	A
118	*Mephitis macroura*	Zorrillo lomo blanco	A
119	*Felis concolor*	Puma, "león"	P
120	*F. onca*	Jaguar, "tigre"	E
121	*F. wiedii*	Tigrillo menor, margay	A
122	*F. pardalis*	Tigrillo mayor, ocelote	P
123	*F. yagouarcundi*	Gato zonto	A
124	*Coendou mexicanus*	Puerco espín	A
125	*Agouti paca*	Tepescuintle	A
126	*Tapirus bairdii*	Tapir, danta	E
127	*Tayassu tajacu*	Cuche de monte de collar	P
128	*Mazama americana*	Venadito rojo, cabro	P (?)

Estado de Población: A = Amenazado
P = En peligro
E = Extinto

APPENDIX 5.

a. List of Pesticides Requested For Use in Democratic Labor Development Project No. 518-0368
b. List of Crops to be Included in the EA on Pesticide Use
c. List of Pesticides Registered for use in El Salvador (MAG/DDA)
d. Banned Pesticides in El Salvador (MAG/DDA)
e. Toxicity, Signal Word, and Color Requirements for Pesticide Lables in El Salvador (MAG/DDA)
f. Amount of Insecticides Imported into El Salvador in 1990 by Technical and Formulated material
g. Pesticide Poisoning Data for First Quarter of 1990 (Data form Statistical Unit ES/MOH)

LISTA DE AGROQUIMICOS QUE USAN CON MAYOR FRECUENCIA LAS COOPERATIVAS Y PRODUCTORES BENEFICIARIOS DEL DRECRETO - 207, AFILIADAS A UNION COMUNAL SALVADOREÑA, U. C. S.

NOMBRE DE LOS PRODUCTOS.

PESTICIDAS

1. *Volaton 2.5. g.*
2. *Lorbans 2.5. g*
3. *Couter 10 g .*
4. *Curater*
5. *Marshal*
6. *Caracolicidas*
7. *Tamarón 600*
8. *Folidol M. 48*
9. *Desis*
10. *Orthene*
11. *Thiodan*
12. *Muvacron*
13. *Furadan*
14. *Ditane M. 45*
15. *Bayletón*
16. *Oxicloruro de C.U.*
17. *Hinosam*
18. *Daconil*
19. *Benlate*

HERBICIDAS

1. *Gramoxone*
2. *Atrazina*
3. *Hedonal 720*
4. *Lasso*
5. *látigo*
6. *Rambo*
7. *Round up*
8. *Surcopur*
9. *Diuroń*
10. *Velpar-L*
11. *Karmex*

FOLIARES

Bayfolan
2. *Bellotion*
3. *Complesal*

ADHERENTES

1. *Disapen*
2. *Pegason*

Nueva San Salvador, 4 de marzo de 1991.

Agr. Guillermo Ruiz Castillo,
Coordinador Nacional del
Programa Agrario U.C.S.

F.O.E.S.

Fundación Obrero Empresarial Salvadoreña

Un esfuerzo para el futuro

M E M O R A N D U M

PARA : Sr. Pedro Llewellyn

A TRAVES DE : Sr. Robert W. Mashek

DE : Ing. Inés María Ortíz

ASUNTO : Lista de cultivos que FOES desea sean incorporados al "Estudio de Pesticidas".

FECHA : San Salvador, 18 de Julio de 1991

Como acordamos en la reunión sostenida ayer por la tarde con los señores Angel Chiri, Sergio Guzmán, Robert Mashek, Pedro Llewellyn y mi persona, adjunto le envío la lista de cultivos que mucho apreciaríamos sean incluidos en el estudio del uso de pesticidas.

CULTIVOS

Maíz, frijol, maicillo, arroz, ocra, frijol vigna, melón, sandía, zacate para pasto, café, ajo, cebolla, cítrico - naranja, yuca, tomate, plátano, marigol.

Atentamente,

cc: Sr. Edwin Palenque

Boulevard del Hipódromo No. 253, Edificio INCOLINAS Colonia San Benito, San Salvador, El Salvador, C.A.
Tel.:23-2525 y 24-4268 FAX 23-2525

LISTADO DE PRODUCTOS REGISTRADOS
EN EL SALVADOR DE 1988 - 1991

NOMBRE COMERCIAL	STATUS[1]	NOMBRE COMUN
INSECTICIDAS		
AGROMIL(2.5 G, 4 E, 5 G)	+	CHLORPYRIFOS
APPLAUD	RU	BUPROFEZIN
ARRIVO(60CE, 300 CE)	RU	CYPERMETHRIN
BACTOSPEINE	+	BACILLUS THURINGIENSIS
BASUDIN 60 CE	+	DIAZINON
BAYTROID 100 CE	RU	CYFLUTHRIN
BELLOTION 800 CE	RU	METHYL PARATHION
BELMARK 30 CE	RU	FENVALERATE
BULLDOCK (12.5 CE, 50 CE)	RU	CYFLUTHRIN
CARBUGRAN 10 G	RU	CARBOFURAN
CIFLUTRIN	RU	CYFLUTHRIN
COUNTER 10 G	RU	TERBUFOS
CURACRON 400 CE	RU	PROFENOFOS
DECIS (2.5 CE, 2.7 UBV)	RU	DELTAMETHRIN
DIAZIGRAN (2.5 G, 5 G)	+	DIAZINON
DIAZINON 5 G	+	DIAZINON
DIAZIPOLVO 2 P	+	DIAZINON
DIPEL	+	B. THURINGIENSIS
DISYSTON	RU	DISULFOTON
DOMINEX	NR	ALPHAMETRIN
DISYSTON 8 LC	RU	DISULFOTON
FOLIDOL (M 480 CE, 800 CE)	RU	METHYL PARATHION
FOLIMAT	NR	OMETHOATE
FOLIPOLVO 2%	RU	METHYL PARATHION
FORITHION M-4 CE	RU	METHYL PARATHION
FORMUTOR 600	RU	METHAMIDOPHOS
FURADAN	RU	CARBOFURAN
GUSATION M 250 CE	RU	AZINPHOS-METHYL
HALMARK (ASANA)	RU	ESFENVALERATE
HERALD 375 CE	NR	FENPROPATHRIN
KARATE	RU	CYHALOTHRIN
LANNATE L	RU	METHOMYL
LARVIN 375	+	THIODICARB
LEBAYCID 500 CE	+	FENTHION
LORSBAN (2.5 G, 4 E)	+	CHLORPYRIFOS
MALATION (4 P, 4%, 57 CE, 800 CE)	+	MALATHION
MARSHAL 250 STD	RP	CARBOSULFAN
METASYSTOX (50 VL, R-250, R 250 SL)	RU	DEMETON METHYl

LISTADO DE PRODUCTOS REGISTRADOS
EN EL SALVADOR DE 1988 - 1991

NOMBRE COMERCIAL	STATUS[1]	NOMBRE COMUN
INSECTICIDAS (Cont'd.)		
MIRAL 10 G	RU	ISAZOFOS
MOCAP 10 G	+	ETHOPROP
MORESTAN	+	OXYTHIOQUINOX
MTD 600	RU	METHAMIDOPHOS
NEMACUR (10 G, 400 CE)	RU	FENAMIPHOS
NUVACRON 60 SCW	RU	MONOCROTOPHOS
OMITE 6 E	+	PROPARGITE
PARATION METILICO	RU	METHYL PARATHION
PERFEKTION	+	DIMETHOATE
PILLARMATE 90	RU	METHOMYL
PILLARTIN 60	RU	MONOCROTOPHOS
POUNCE 75 CE	RU	PERMETHRIN
QUIMA TD 600	RU	METHAMIDOPHOS
QUIMADRIN 5 CSW	RU	MONOCROTOPHOS
QUIMATION (M-480 CE, M-800 CE)	RU	METHYL PARATHION
QUIMATOX M 6-3	NR	TOXAPHENE-METHYL
RIPCORD 20% CE	RU	CYPERMETHRIN
SUMICIDIN 30 CE	RU	FENVALERATE
TALSTAR 100 CE	RU	BIFENTHRIN
TAMARON 600 SL	RU	METHAMIDOPHOS
TERBUGRAN 10 G	RU	TERBUFOS
THIMET 10 G	RU	PHORATE
THIODAN 35 CE	RU	ENDOSULFAN
THURICIDE HP	+	B. THURINGIENSIS
TOKUTION (1.5 P, 5 G, 500 CE)	NR	PROTHIOPHOS
TRUENO 50 CE		
UNDEN 50 WP	RP	PROPOXUR
VOLATON (1.5 G, 1.5%, 2.5. G, 5 G, 500 CE, 800 ULV)	NR	PHOXIM
VYDATE L	RU	OXAMYL
HERBICIDAS		
ALLY	NR	METSULFURON METHYL
AMINA 2, 4-D	+	2, 4-D
ARROSOLO	+	MOLINATE + PROPANIL
ASSURE	-	QUIZALOFOP-ETHYL
ATRAZINA 80 PM	+	ATRAZINE
BASAGRAN M-60	+	BENTAZON
BASTA	NR	GLUFOSINATE-AMMONIUM
COTORAN 80 WP	-	FLUOMETURON
DIURON 80 PM	+	DIURON
DMA-6	NR	DSMA
DOWPON	+	DALAPON

LISTADO DE PRODUCTOS REGISTRADOS
EN EL SALVADOR DE 1988 - 1991

NOMBRE COMERCIAL	STATUS[1]	NOMBRE COMUN
HERBICIDAS (Cont'd.)		
FURORE	+	FENOXAPROP - ETHYL
FUSILADE	+	FLUAZIFOP - BUTYL
GESAPAX 80 WP	+	AMETRYN
GESAPRIM (80 WP, 500 FW)	+	ATRAZINE
GLYFOSATO	+	GLYPHOSATE
GOAL	+	OXYFLUORFEN
GRAMOXONE	RU	PARAQUAT
HEDONAL (600 SL, 720)	+	2,4-D/DICHLORPROP
HERBAX LV-30	+	PROPANIL
HERBAXON	RU	PARAQUAT
HYVAR X	-	BROMACIL
IGRAN 500 FW	NR	TERBUTRYN
KARMEX	+	DIURON
LATIGO	+	GLYPHOSATE
MACHETE	NR	BUTACHLOR
PARAGUAT BAYER	RU	PARAQUAT
PROPASINT LV-30	+	PROPANIL
PROWL 500 CE	+	PENDIMETHALIN
PROZINE	-	PENDIMETHALIN + ATRAZINE
QUIMQUAT	RU	PARAQUAT
REGLONE	+	DIQUAT
ROUNDUP	+	GLYPHOSATE
SENCOR	+	METRIBUZIN
SINFLUORAN CE	+	TRIFLURALIN
STAM (LV-10, 540)	+	PROPANIL
SURCOPUR (360 CE, 480)	+	PROPANIL
VELPAR (L, RP)	-	HEXAZINONE
FUNGICIDAS		
AFUGAN	NR	PYRAZOPHOS
ANVIL	NR	HEXACONAZOLE
BASAMID	NR	DAZOMET
BAVISTIN	RP	CARBENDAZIM
BAYFIDAN (25% W, 3% G)	+	TRIADIMENOL
BAYLETON 250 CE	+	TRIADIMEFON
BENLATE (DF, 50 DF)	+	BENOMYL
COBRE-ANTRACOL	-	COPPER-PROPINEB
CUPRAVIT VERDE	+	COPPER OXYCHLORIDE
CURZATE M-8	-	CYMOXANIL/MANCOZEB
CYCOCIN 50 DF	+	THIOPHANATE-METHYL
DACONIL 2787	+	CHLOROTHALONIL
DELSENE (50 DF, M-200)	RP	CARBENDAZIM
DEROSAL	RP	CARBENDAZIM
DITHANE M-45	+	MANCOZEB

LISTADO DE PRODUCTOS REGISTRADOS
EN EL SALVADOR DE 1988 - 1991

NOMBRE COMERCIAL	STATUS[1]	NOMBRE COMUN
FUNGICIDAS (Cont'd.)		
HINOSAN 500 CE	NR	EDIFENPHOS
KASUMIN 2% L	NR	KASUGAMYCIN
KOCIDE 101	+	COPPER HYDROXIDE
KUMULUS	+	SULFUR
MANCOZEB 80 WP	+	MANCOZEB
MANZATE (200, 200 DF)	+	MANEB
MONCEREN COMBI 70	NR	PENCYCURON
OXICLORURO DE COBRE	+	COPPER OXYCHLORIDE
PORMASOL 80 WP	+	THIRAM +
PREVICUR N	NR	PROTHIOCARB
Q- 2000	-	IODINE
RIDOMIL (5 G, MZ-72)	+	METALAXYL
RIZOLEX	NR	TOLCLOFOS - METHYL
ROVRAL	+	IPRODIONE
TRIMILTOX FORTE	+	MANCOZEB + COPPER SALTS
VONDOZEB (L, 80 PM)	+	MANCOZEB

[1] Status indicated by + = see table 2 for crop tolerances;
RU=EPA restricted use; RP=EPA registration pending;
NR=not registered by EPA;
"-"=mixtures or products not for use on project crops

PRODUCTOS QUE HAN SIDO CANCELADOS LOS REGISTROS Y PROHIBIDA LA IMPORTACION Y COMERCIALIZACION EN EL PAIS.

PRODUCTO	CLASE	MOTIVO	AÑO CANC.
DDT	Insecticida	Por los riesgos que implica su uso para la salud humana, asi como también por la contaminación ambiental, y de la flora, fauna, aguas corrientes y alimentos, por ser un producto altamente persistente en el ambiente.	1980
2, 4, 5 T P (SILVEX)	Herbicida	Por causar efectos fetottóxicos, teratogénicos y carcinógenos en la salud humana y animal.	1980
2,4,5 T (TRIBUTON 600, ESTERON 245, TORDON 155, TRAXONE, BRUSHKILLER, HERBEXAL DT 480 etc.	Herbicida		1980
LEPTOPHOS (PHOSVEL)	Insecticida	Por causar efectos neurotóxicos retardados o sea de características irreversibles. Además por ser un producto persistente y acumulativo.	

.../

PRODUCTO	CLASE	MOTIVO	AÑO CANC.
PARATHION ETHILICO UBV/	Insecticida	Por ser extremadamente tóxico para los humanos.	1980
DIMETHOATO EN POLVO.	Insecticida	Produce efectos de mutación - genética, cercinogénicas y te tatogénicas.	-
PCNB (PENTACLORONI-TROBENCENO).	Fungicida	Por retiro voluntario de la - casa.	-
ALDRIN	Insecticida	Por ser un producto organoclo rado persistente en el ambien te y por su alta residualidad, con posibles efectos teratogé nicos en el humano.	-
DIELDRIN	Insecticida	Es un producto organoclorado persistente en el ambiente y por alta residualidad en los productos de consumo y - expor tación.	1986
ENDRIN	Insecticida	" " " "	1986
CHLORDANE	Insecticida	" " " "	1986
HEPTACHLOR	Insecticida	" " " "	1986
CLORDIMEFORM	Insecticida	Por retiro voluntario de la casa registrante.	1987
TRIFENO	Insecticida	Producto persistente y por - su alta residualidad en el ambiente.	1988
CLORANFENICOL	Antibiótico de uso veterinario.	Por producir efectos carcinó genos en animales.	1988

CLASE	DL50 (RATAS) mg/Kg de Peso			
	ORAL		DERMAL	
CATEGORIA	SOLIDOS	LIQUIDOS	SOLIDOS	LIQUIDOS
EXTREMADAMENTE TOXICO CAT. I	≤ 5	≤ 20	≤ 10	≤ 40
ALTAMENTE TOXICO CAT. II	> 5 ≤ 50	> 20 ≤ 200	> 10 ≤ 100	> 40 ≤ 400
MODERADAMENTE TOXICO CAT. III	> 50 ≤ 500	> 200 ≤ 2000	> 100 ≤ 1000	> 400 ≤ 4000
LIGERAMENTE TOXICO CAT. IV	> 500	> 2000	> 1000	> 4000

E T I Q U E T A S

	TAMAÑO	
1 Lto. ó 1 Kgr.	26 X 16 cm.	Franja 2.5 cms.
≤ 4 Lts. ó 5 Kgr.	42 X 16 cm.	Franja 2.5 cms.
≤ 19 Lts. ó 25 Kgr.	45 X 24 cm.	Franja 3.5 cms.
≥ 19 Lts. ó 25 Kgr.	60 X 24 cm.	Franja 3.5 cms.

LECTURA EN LA FRANJA 0.5 cm DE ALTO EN TODOS LOS TAMAÑOS.

IMPORTATIONS OF INSECTICIDES, 1990
TECHNICAL MATERIAL

COMMON NAME	$ US
(ARRANGED ALPHABETICALLY)	
ALPHA CYPERMETHRIN**	122,243
CARBOFURAN	308,166
CYFLUTHRIN	318,939
CYPERMETHRIN	209,209
DDVP	39,345
DISULFOTON	13,214
ENDOSULFAN	163,000
FENAMIPHOS	10,297
MALATHION*	53,150
METHAMIDOPHOS	1,064,546
METHIOCARB	27,875
METHYL PARATHION	561,400
METHOMYL	148,230
OMETHOATE**	21,544
PERMETHRIN	35,252
PHOXIM**	101,618
PROPOXUR	314,060
PROTHIOPHOS**	31,385
TRICHLORFON*	34,320

(ARRANGED BY VALUE)

COMMON NAME	$ US
METHAMIDOPHOS	1,064,546
METHYL PARATHION	561,400
CYFLUTHRIN	318,939
PROPOXUR	314,060
CARBOFURAN	308,166
CYPERMETHRIN	209,209
ENDOSULFAN	163,000
METHOMYL	148,230
ALPHA-CYPERMETHRIN**	122,243
PHOXIM**	101,618
MALATHION*	53,150
DDVP	39,345
PERMETHRIN	35,252
TRICHLORFON*	34,320
PROTHIOPHOS**	31,385
METHIOCARB	27,875
OMETHOATE**	21,544
DISULFOTON	13,214
FENAMIPHOS	10,297

* GENERAL USE
** NOT REGISTERED IN USA

IMPORTATIONS OF INSECTICIDES, 1990
FORMULATED PRODUCT

COMMON NAME	$ US
(ARRANGED ALPHABETICALLY)	
BACILLUS THURINGIENSIS	39,165
BIFENTHRIN	61,500
CARBOSULFAN	111,750
CHLORPYRIFOS 4E	83,939
CHLORPYRIFOS 2.5G	284,873
CHORPYRIFOS 5 G	73,481
CHLORFLURAZUM**	103,950
CYFLUTHRIN	5,725
DDVP	79,160
DELTAMETHRIN**	86,400
DIAZINON*	100,100
DIMETHOATE	15,696
DISULFOTON	46,500
FENTHION	87,514
ISOFENPHOS	13,400
LAMBDA-CYHALOTHRIN	660,818
MALATHION*	134,050
METHYL PARATHION	162,508
OXAMYL	192,814
PERMETHRIN	87,200
PHOXIM**	207,504
POLO**	5,000
PROFENOFOS	29,000
PROPOXUR	2,650
TERBUFOS	125,000
TRUENO**	64,000

* GENERAL USE
** NOT REGISTERED IN USA

IMPORTATIONS OF INSECTICIDES, 1990
FORMULATED PRODUCT

COMMON NAME	$ US
(ARRANGED BY VALUE)	
LAMBDA-CYHALOTHRIN	660,818
CHLORPYRIFOS 2.5G	284,873
PHOXIM**	207,504
OXAMYL	192,814
METHYL PARATHION	162,508
MALATHION*	134,050
TERBUFOS	125,000
CARBOSULFAN	111,750
CHLORFLURAZUM**	103,950
DIAZINON*	100,100
FENTHION	87,514
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DIMETHOATE	15,696
ISOFENPHOS	13,400
CYFLUTHRIN	5,725
POLO**	5,000
PROPOXUR	2,650

* GENERAL USE
** NOT REGISTERED IN USA

IMPORTACIONES DE HERBICIDAS

1 9 9 0

	NOMBRE DEL HERBICIDA	TOTAL IMPORTADO EN DOLARES
*	PARAQUAT	4,743,148.00
	AMINA 2-4-D	654,142.00
	ATRAZINA	587,000.00
	PROPANIL	420,490.00
	DIURON	302,885.00
	LATIGO	202,003.00
	AMETRINA	173,150.00
	ROUNDUP	121,680.00
	PENDIMETALIN	112,578.00
	VELPAR	110,816.00
	PICLORAN	99,390.00
	FURORE	74,700.00
	BASAGRAN	50,040.00
	DUAL	50,000.00
	COTORAN	42,500.00
	TRIFLURALINA	42,000.00
	ALACLOR	37,260.00
	HYVAR	32,970.00
	VELPAR	28,850.00
	ERRADICANE	20,352.00
	ALLY	14,450.00
	DACONATE	14,029.00
	BASTA	11,850.00
	BUTACLOR	11,174.00
	GARDOPRIM	10,100.00
	METRIBUZIN	4,649.00
	ASSURE	2,059.00

MINISTERIO DE SALUD PUBLICA Y ASISTENCIA SOCIAL
UNIDAD DE ESTADISTICA

CONSULTA EXTERNA

EFECTO TOXICO DE OTRAS SUSTANCIAS DE PROCEDENCIA NO PRINCIPALMENTE MEDICINAL (989)

NIVEL NACIONAL

PRIMER SEMESTRE - 1990

SAN SALVADOR, 7 DE AGOSTO DE 1991.

MINISTERIO DE SALUD PUBLICA Y ASISTENCIA SOCIAL - EL SALVADOR
UNIDAD DE ESTADISTICA
CAUSAS DE MORBILIDAD Y FACTORES QUE INFLUYEN EN EL ESTADO DE SALUD Y EN EL CONTACTO CON LOS SERVICIOS DE SALUD - CONSULTA EXTERNA - SEGUN FRECUENCIA, SEXO, CONSULTAS TOTALES, GRUPOS DE EDAD, PRIMERA CONSULTA, PROCEDENCIA DEL PACIENTE Y CONCENTRACION
(CIE - 9a. REVISION)
CONSULTA EXTERNA - (989) - NIVEL NACIONAL - PRIMER SEMESTRE - 1990

	H O M B R E S			M U J E R E S			T O T A L E S					
EDAD	TOT CONS	1RA. CONS	URB	TOT CONS	1RA. CONS	URB	CONS	1RA.	URB	CONCEN-TRACION	% 1RA.	% URB
1 DIAG 989	EFECTO TOXICO DE OTRAS SUST. NO MEDICINALES											
< 1 año	12	0	12	24	24	24	36	24	36	1.5	66.7%	100.0%
1 a 4	48	48	24	90	78	36	138	126	60	1.1	91.3%	43.5%
5 a 14	184	144	96	150	150	36	334	294	132	1.1	88.0%	39.5%
15 a 44	372	360	144	354	342	156	726	702	300	1.0	96.7%	41.3%
45 a 59	96	72	72	138	138	78	234	210	150	1.1	89.7%	64.1%
> de 60	48	48	36	42	42	42	90	90	78	1.0	100.0%	86.7%
TOTAL CONSULTAS			1558			TOTAL 1ra. CONSULTA		1446		CONCENTRACION		1.1
% DEL TOTAL CONSULTAS			100.0%	ACUMULADO		100.0%	% DEL TOTAL DE 1ra. CONSULTA		100.0%	ACUMULADO		100.0%

T O T A L E S G E N E R A L E S

< 1 año	12	0	12	24	24	24	36	24	36	1.5	66.7%	100.0%
1 a 4	48	48	24	90	78	36	138	126	60	1.1	91.3%	43.5%
5 a 14	184	144	96	150	150	36	334	294	132	1.1	88.0%	39.5%
15 a 44	372	360	144	354	342	156	726	702	300	1.0	96.7%	41.3%
45 a 59	96	72	72	138	138	78	234	210	150	1.1	89.7%	64.1%
> de 60	48	48	36	42	42	42	90	90	78	1.0	100.0%	86.7%
TOTAL CONSULTAS			1558			TOTAL 1ra. CONSULTA			1446.0			

UNIDAD DE ESTADISTICA

PRIMERAS DIEZ CAUSAS DE MORBILIDAD DE CONSULTA EXTERNA
SEGUN LISTA DE CATEGORIAS DE TRES DIGITOS. CIE 9a. REVISION
EN ESTABLECIMIENTOS DEL MINISTERIO DE SALUD
CONSULTA EXTERNA - (989) - NIVEL NACIONAL - PRIMER SEMESTRE - 1990

A.- PRIMERAS CONSULTAS POR CAUSA

CODIGO		No. CONSULTAS	%	% ACUMULADO
989	EFECTO TOXICO DE OTRAS SUST. NO MEDICINALES	1,446	100.00	100.00
	Sub Total	1,446		
	Todas las demas 1ras Consultas	0	0.00	100.00
	Total General	1,446		

B.- CONCENTRACION POR CAUSA

CODIGO		CONCENTRACION	TOTAL CONSULTAS %	% ACUMULADO
989	EFECTO TOXICO DE OTRAS SUST. NO MEDICINALES	1.0	100.00	100.00

C.- TOTAL CONSULTAS POR CAUSA (PRIMERAS + SUBSECUENTES)

CODIGO		No. CONSULTAS	%	% ACUMULADO
989	EFECTO TOXICO DE OTRAS SUST. NO MEDICINALES	1,558	100.00	100.00
	Sub Total	1,558		
	Todas las demas Consultas	0	0.00	100.00
	Total General	1,558		

MINISTERIO DE SALUD PUBLICA Y ASISTENCIA SOCIAL
UNIDAD DE ESTADISTICA

EGRESOS HOSPITALARIOS

EFECTO TOXICO DE OTRAS SUSTANCIAS DE PROCEDENCIA NO PRINCIPALMENTE MEDICINAL (989.0 - 989.9)

NIVEL NACIONAL

PRIMER SEMESTRE - 1990

SAN SALVADOR, 7 DE AGOSTO DE 1991.

MINISTERIO DE SALUD PUBLICA Y ASISTENCIA SOCIAL - EL SALVADOR
UNIDAD DE ESTADISTICA
DISTRIBUCION DE LAS - 7 - PRIMERAS CAUSAS DE EGRESO HOSPITALARIO
SEGUN SEXO, GRUPO DE EDADES, PROMEDIO DE ESTANCIA, CONDICION DE SALIDA
Y PROCEDENCIA DEL PACIENTE

EGRESO HOSPITALARIO (989.0 - 989.9) NIVEL NACIONAL 1er.SEMESTRE 1990

	H O M B R E S			M U J E R E S							
EDAD	EGSOS	ESTA PROM	MUER	EGSOS	ESTA PROM	MUER		TOTAL EGSOS	ESTA PROM	CASOS OBS	TOT MUER	MT/EG
1 DIAG 989.3	EFECTO TOXICO FOSFATO ORGANICO Y CARBAMATO.											
< 1 año	6	1.0	0	1	3.0	0		7	1.3	0	0	0.0%
1 a 4	14	3.4	0	22	4.9	0		36	4.3	14	0	0.0%
5 a 14	14	1.2	2	22	2.6	5		36	2.1	12	7	19.4%
15 a 44	265	2.7	45	186	2.7	59		451	2.7	189	104	23.1%
45 a 59	42	2.4	12	9	2.5	3		51	2.4	25	15	29.4%
> de 60	13	4.9	0	0	0.0	0		13	4.9	4	0	0.0%
TOT EGRE	594	58.5% TOT EGRESOS		TOT MUERTES		126	68.11%	RELATIVO				
		58.5% ACUMULADO		21.2% ***			68.11%	ACUMULADO				
2 DIAG 989.4	EFECTO TOXICO INSECTICIDAS NO CLASIFICADOS OTRA PARTE											
< 1 año	0	0.0	0	0	0.0	0		0	0.0	0	0	0.0%
1 a 4	6	1.0	0	5	2.4	0		11	1.6	4	0	0.0%
5 a 14	9	2.9	0	6	2.6	2		15	2.8	4	2	13.3%
15 a 44	121	4.3	28	47	3.7	8		168	4.1	41	36	21.4%
45 a 59	19	3.3	4	4	5.3	2		23	3.6	8	6	26.1%
> de 60	15	5.4	5	0	0.0	0		15	5.4	6	5	33.3%
TOT EGRE	232	22.9% TOT EGRESOS		TOT MUERTES		49	26.49%	RELATIVO				
		81.4% ACUMULADO		21.1% ***			94.59%	ACUMULADO				
3 DIAG 989.5	EFECTO TOXICO DE PONZOÑAS DE ANIMALES											
< 1 año	0	0.0	0	0	0.0	0		0	0.0	0	0	0.0%
1 a 4	6	1.0	2	4	2.0	0		10	1.4	6	2	20.0%
5 a 14	13	5.5	0	9	1.1	3		22	3.7	4	3	13.6%
15 a 44	45	3.6	0	19	1.4	0		64	2.9	25	0	0.0%
45 a 59	15	4.1	2	5	1.4	0		20	3.4	5	2	10.0%
> de 60	17	3.0	2	2	3.0	0		19	3.0	4	2	10.5%
TOT EGRE	135	13.3% TOT EGRESOS		TOT MUERTES		9	4.86%	RELATIVO				
		94.7% ACUMULADO		6.7% ***			99.46%	ACUMULADO				
4 DIAG 989.2	EFECTO TOXICO DE HIDROCARBOROS CLORADOS.											
< 1 año	0	0.0	0	1	1.0	0		1	1.0	0	0	0.0%
1 a 4	0	0.0	0	2	1.0	0		2	1.0	0	0	0.0%
5 a 14	0	0.0	0	0	0.0	0		0	0.0	0	0	0.0%
15 a 44	20	2.4	0	10	2.4	0		30	2.4	6	0	0.0%
45 a 59	4	1.5	0	0	0.0	0		4	1.5	2	0	0.0%
> de 60	0	0.0	0	0	0.0	0		0	0.0	0	0	0.0%
TOT EGRE	37	3.6% TOT EGRESOS		TOT MUERTES		0	0.00%	RELATIVO				
		98.3% ACUMULADO		0.0% ***			99.46%	ACUMULADO				
5 DIAG 989.9	EFECTO TOXICO DE SUSTANCIAS NO MEDICINALES SIN ESPECIF											
< 1 año	1	2.0	0	0	0.0	0		1	2.0	0	0	0.0%
1 a 4	2	1.0	0	0	0.0	0		2	1.0	0	0	0.0%
5 a 14	2	2.0	0	0	0.0	0		2	2.0	0	0	0.0%
15 a 44	0	0.0	0	2	2.0	0		2	2.0	2	0	0.0%
45 a 59	0	0.0	0	0	0.0	0		0	0.0	0	0	0.0%
> de 60	0	0.0	0	0	0.0	0		0	0.0	0	0	0.0%
TOT EGRE	7	0.7% TOT EGRESOS		TOT MUERTES		0	0.00%	RELATIVO				
		99.0% ACUMULADO		0.0% ***			99.46%	ACUMULADO				

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EGRESO HOSPITALARIO (989.0 - 989.9) NIVEL NACIONAL 1er.SEMESTRE 1990

	HOMBRES			MUJERES			TOTAL	ESTA	CASOS	TOT	
EDAD	EGSOS	ESTA PROM	MUER	EGSOS	ESTA PROM	MUER	EGSOS	PROM	URB	MUER	MT/EG
6 DIAG 989.8 OTROS EFECTOS TOXICOS DE SUSTANCIAS NO MEDICINALES											
< 1 año	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0%
1 a 4	0	0.0	0	1	1.0	1	1	1.0	1	1	100%
5 a 14	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0%
15 a 44	2	2.0	0	2	3.0	0	4	2.5	2	0	0.0%
45 a 59	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0%
> de 60	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0%
TOT EGRE	5	0.5% TOT EGRESOS		TOT MUERTES		1	0.54%	RELATIVO			
		99.5% ACUMULADO		20.0% ***			100.0%	ACUMULADO			
7 DIAG 989.0 EFECTO TOXICO POR ACIDO CIANHIDRICO Y CIANUROS.											
< 1 año	2	1.0	0	0	0.0	0	2	1.0	0	0	0.0%
1 a 4	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0%
5 a 14	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0%
15 a 44	0	0.0	0	1	2.0	0	1	2.0	0	0	0.0%
45 a 59	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0%
> de 60	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0%
TOT EGRE.	3	0.3% TOT EGRESOS		TOT MUERTES		0	0.00%	RELATIVO			
		99.8% ACUMULADO		0.0% ***			100.0%	ACUMULADO			

TOTAL DE EGRESOS = 1015 TOTAL DE MUERTES = 185

APPENDIX 6.

a. FUSADES/DIVAGRO Crop Pest Control Guides for Green Beans

b. SESAME de El Salvador Crop Pest Control Guide for Sesame Production

c. List of Crops, Pests, and Controls Used in the AIFLD/DLDP-ATAC Project areas

d. List of the Most Commonly Used Pesticides in the Proposed Project Areas

LISTA DE AGROQUIMICOS
PARA CONTROL DE ENFERMEDADES
DE FRIJOL PARA EJOTE

1. Recomendaciones Generales

1.1 Aplicar los programas preventivos de aplicaciones de fungicidas.
1.2 Usar las dosis correctas de los fungicidas y aplicarlos con ropa y equipo de seguridad.
1.3 Usar volúmenes de agua apropiados al desarrollo del cultivo y siempre usar un surfactante que logre adecuada distribución del fungicida en las hojas.
1.4 Podrán aplicarse los fungicidas mezclados con los insecticidas si hay compatibilidad.
1.5 Las plantaciones debe revisarse de 2 a 3 veces por semana poniendo también cudidado en el área foliar de las partes bajas, e intermedia de la planta.
1.6 Calibrar los equipos de aplicación.

2. Virosis

En estos cultivos las enfermedades causadas por virus son limitantes, sobre todo si afectan a la planta los primeros 30 días. En vista de estos problemas se deberán tomar las medidas siguientes:

2.1 Evitar el paso de personas por los campos afectados con virosis.

2.2 Dejar por último los lotes con virosis para los trabajos en operaciones.

2.3 Las plantas que se detectan con virosis en las primera tres semanas deben ser eliminadas.

2.4 En el control de los insectos, se deberá considerar con mucha atención un programa cuidadoso de control de posibles vectores.

2.5 Evitar que personas que hayan pasado por campos afectados con virosis, visiten plantaciones sanas.

3. Enfermedades Importantes Susceptibles de Control

1. Mal del talluelo (Pythium sp.)
2. Antracnosis (Colletotrichum lindemuthianum)
3. Mancha angular (Isariopsis griseola)
4. Moho algodonoso (Sclerotinia sp.)
5. Mustia bacterial (Xanthomonas phaseoli o Pseudomonas phaseolicola)
6. Virosis (Mosaico amarillo y mosaico comum o rugoso)

4. Productos que pueden usarse

	PRODUCTOS	DOSIS/LTR	TOLERANCIA PPM	DIAS ANTES COSECHA
1.	Benomyl (Benlate)	0.25-0.50 lbs	2	14
2.	Clorotalonil (Daconil, Clortosip o Bravo)	1.0 kgs	5	7
3.	Fungicidas Cúpricos Micronizado (óxido, hidróxido)	1.0 kgs	Exento	No aplicar después de iniciada la cosecha

5. Programa de Control de Enfermedades

Estas aplicaciones pueden realizarse usando un fungicida cúprico o con un antibiótico como el Agrimicín 100, pero en el caso de detectar presencia de mustias bacteriales.

L:\EJOTE.ENF\Correcciones: RD/14.03.91
FUSADES/DIVAGRO, Calidad Integral

LISTA DE AGROQUIMICOS PARA CONTROL DE PLAGAS DE FRIJOL PARA EJOTE

1. Recomendaciones Generales

1.1 Para detectar la presencia de plagas deberá hacerse diariamente un muestreo, en el que se debn examinar minuciosamente las plantas.

1.2 Las aplicaciones de insecticidas no deben hacerse programadas o calendarizadas.

1.3 Los insecticidas a usarse deben ser los espeficicados para cada plaga.

1.4 Sólo deberán usarse los insecticidas indicados para cada plaga y en su aplicación deben cumplirse las medidas de seguridad.

2. Plagas Importantes

2.1 Plagas del suelo (Gusanos cortadores o de alambre, orugas, etc.)

2.2 Insectos Chupadores (Mosca blanca (Bemisia tabaci, salta hojas (Empoasca sp.) y áfidos.

2.3 Tortuguillas (Diabrotica sp. o Cerotoma sp.)

2.4 Gusanos desfoliadores (Prodenia sp., Spodoptera sp., Heliothis sp., Trichoplusia, etc.)

2.5 Picudo de la vaina (Apion godmani)

3. Insecticidas y Otros Productos

Productos	Dosis/mz	Tolerancia PPM	Dias	
*Esfenvalerate 10% (Asana o Halmark)	0.33 lts	-	-	
Malathion 57 CE (Belathión Malathión)	1.0-1.5 lts	8	1	
*Metomil 90PS (Lannate, Metavin, Nudrin)	0.25-0.50	2.0	2	-
Dimetoato (Perfection, rogar)	--	2.0	1	
Diazinon (Diazinon, Basudin 60 CE)	1.0 lts	0.5	7	
Endosulfan 35CE (Thiodan)	1.0-1.5 lts	2	0	
Ethoprop (Mocap 10%)	--	0.02	-	
Parathion metilico (Pencap-M) Folidol M-48	0.5-1.0 lts	--	15	

*Uso restringido: (-) = información no disponible

... continuación

3. Insecticidas y Otros Productos

Productos	Dosis	Tolerancia PPM	Dias
Bacillus thuringiensis (Dipel, Thuricide, Javelin	0.3-1.0 kgs	Exento	0
*Oxidimeton Metil (Metasistox)	0.3-0.5 lts	0.5	21
Acephate 75 PM (Orthene)	0.5 kgs	0.3	14
Disulfaton (Dysiston 15)	--	0.75	-

* Uso restringido; (-) = información no disponible

4. Epoca de las Aplicaciones

No se recomienda aplicar insecticidas calendarizadamente, pero durante los primeros 30 días para el control de insectos chupadores se debe tener un estricto cuidado, entonces solo si hay presencia de estas plagas se usarán los insecticidas.

En todo caso las aplicaciones se harán de acuerdo al aparecimiento de los problemas, con los productos apropiados y que se resumen en el cuadro siguiente:

PLAGA	PRODUCTOS*
Insectos del suelo	Cloropirifos (Lorsban) o Diazinon o Carbofurano.
Chupadores	Metamidofos, Metasistox, Endosulfán, Malathion o Acephate.
Tortuguillas	Endosulfan, Gusathion, Malathion, Sevin o Diazinón.
Minador	Diazinón.
Larvas desfoliadoras	B. thuringiensis, Metomil, Gusathion, Permetrina, Esfenvalerate.
Picudo de la vaina	Malathión, Endosulfán.
Babosas	Usar cebos envenenados a base de Metaldehido.

* Para aplicar estos productos es necesario siempre observar antes el periodo de espera.

sesame
de EL SALVADOR, S.A. de C.V.

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EXPORTACION DE AJONJOLI

HOJA DIVULGATIVA No.3
1991

"SIEMBRE AJONJOLI"

Por: Ing. Humberto Antonio Espinoza

Gerente de Asistencia Técnica y Comercialización

PERIODO VEGETATIVO: De 100 a 110 días en variedades de un solo eje y de 110 a 120 días en variedades ramificadas.

ADAPTACION: De 0 a 600 m.s.n.m., y suelos de preferencia franco arenosos ó textura franca, de buen drenaje. El pH del suelo debe oscilar entre 5.5 a 7.5

EPOCA DE SIEMBRA: De la segunda quincena de julio a la primera quincena de agosto.
La siembra de humedad se recomienda sembrar el ajonjolí a más tardar la primera quincena de noviembre, tomando en cuenta el tipo de drenaje que tenga el suelo.

PREPARACION DEL TERRENO: Se recomienda dar dos pasos de rastra previo a la siembra, seguido de la pulida si fuese necesario.

SIEMBRA: Se recomienda sembrar el ajonjolí a una profundidad máxima de 2 cms, siembra a chorro seguido o por postura.
El distanciamiento entre surcos se recomienda de 80 cm. entre surco y 20 cm. entre plantas en variedades ramificadas; y 70 cm. entre surcos 15 cm. entre plantas en variedades de un eje.

CONTROL DE MALEZAS: Se recomiendan los siguientes tratamientos:
1o.- Aplicando 5 Lts. de Gramoxone por manzana más 2 Lts. de Hedonal 720 SL., previo a la siembra para el control de Gramineas y hoja ancha.
2o.- Aplicando 2 Lts. de Lazo 480 EC. por manzana más 2 Lts de Látigo, inmediatamente después de la siembra para el control de Gramineas y hojas anchas.

FERTILIZACION: Se recomiendan 3 quintales por manzana de la Formula 16-20-0 al momento de la siembra y 3 quintales por manzana de Sulfato de Amónio 21 % ó bien 1.5 quintales por manzana de Urea 46o/o al inicio de la floración.

PLAGAS Y ENFERMEDADES: Las plagas que más afectan son: la Tortuguilla, Masticadores del Follage, Afidos, Gusano Medidor; y las enfermedades que más están atacando son la Cercospora sesami Zimm., y el Pie Negro, Pata Negra ó Pudrición del pie (Phytophtora sp)

CONTROL: Se recomienda aplicar:

Tamarón 600 SL.	1	Lts. por	manzana.
Folidol M-480 EC.	1	Lts. por	manzana.
Azodrin 60o/o	1	Lts. por	manzana.
Daconil W-75.	1	kg. por	manzana.
Cobre Sandoz .	1	Kg. por	manzana.
Cupravit Verde.	1.5	Kg. por	manzana.
Antracol 70 Wp.	1.5	Kg. por	manzana.

COSECHA: Cuando la coloración del tallo y cápsula en la parte baja de la planta pasa de verde amarillento a café, debe cortarse la planta para luego hacer manojos de más o menos 15 plantas.
Estos se secan al sol en parvas, una vez bien secos se aporrean en lonas, para evitar perdida de semillas, luego se limpia de palos, hojas, y casullas, procediendo a envasarlos en sacos de manta o polipropileno.

VARIEDADES: ICTA R-198. Ciclo de 110 días. Semi-ramificada.
Rendimiento de 15 a 18 quintales por manzana.
CUYUMAQUI. Ciclo de 110 días. Semi-ramificada. Rendimiento de 12 quintales por manzana.

SESAME DE EL SALVADOR, S.A. DE C.V., le ofrece: 1o. Asistencia Técnica durante todo el desarrollo del cultivo, 2o. Comercialización de su Ajonjolí a BUEN PRECIO.

Table 3. Plagas Claves en Los Cultivos Principales del DLDP/ATAC Proyecto en El Salvador. (Cont'd.)

CULTIVO	PLAGA	CONTROL	ALTERNATIVA Q U I M I C O	IPM
CAÑA	AENEOLAMIA	DIAZINON	MALATHION	MUESTREOS
		METAMIDOFOS	- -	APLICACION POR FOCOS
		OXAMIL	- -	CONTROL DE
		CARBOFURAN 5%		NINFAS CAMAN
	PHYLLOPHAGA	CLORPIRIFOS	- -	APLICACION EN BANDA
		TERBUFOS	- -	
		CARBOFURAN	- -	
		DIAZINON	- -	
	NEMATODOS	CARBOFURAN	- -	- -
	MALEZAS	HEXAZINONA	ALLY	CONTROL MANUAL
		DIURON		
		IGRAN		
		ASULOX		

Comentarios: Diatraca is usually not a pest; Trichoplusia ni sometimes is a pest, but only on certain varieties.

MAIZ	SPODOPTERA	FOXIM	B.T.	APLICACION DIRIGIDA
		CLORPIRIFOS		
		METOMIL		
		VOLATON		
	PHYLLOPHAGA	FOXIM	- -	APLICACION
		AGROMIL		BANDA
		VOLATON		
		CLORPIRIFOS	- -	
		DIAZINON	- -	
		MARSHALL	- -	
		GAUCHO	- -	
	CARAPACHUDA			
	GUSANO SOLDADO	METOMIL		
		TAMARON		

Table 3. Plagas Claves en Los Cultivos Principales del DLDP/ATAC Proyecto en El Salvador. (Cont'd.)

CULTIVO	PLAGA	CONTROL	ALTERNATIVA QUIMICO	IPM
MAIZ (Cont'd)	MALEZAS	ATRAZINA	- -	CONTROL MANUAL
		2,4-D	- -	CONTROL
		HEDONAL		MECANICO
		GRAMOXONE	- -	
	Comentarios: B.T. not used because of high cost.			
ARROZ	MOCIS PRODINIA	METAMIDOFOS	CIPERMETRINA B.T.	- -
	OEBALUS ALKINDUS Y OTRAS	METAMIDOFOS PARATION METILICO	CIPERMETRINAS CLORPIRIFOS	- -
	TIJIRILLA	PARATION METILICO	- - -	- -
	MALEZAS	PROPANIL	ALLY	CONTROL MANUAL
		BUTACHLOR BASAGRAN FURORE	BASAGRAN	
	PIRICULARIA	MANZATE	BENLATE	VARIEDADES RESISTENTE
		HINOSAN		
SORGO	CONTARINIA	CIPERMETRINA	- -	EPOCA DE APLICACION
		CLORPIRIFOS	- -	
		METAMIDOFOS	- -	
		METOMIL LEBAYCID	- -	
	PHYLLOPHAGA	CLORPIRIFOS FOXIM	DIAZINON	- -
	SPODOPTERA			
	MALEZAS	ATRAZINA	BASAGRAN	CONTROL MANUAL
		2,4-D	DUAL*	CONTROL QUIMICO
		GRAMOXONE		

* Aplicado presiembra incorporado y semillas tratadas con Conceps II.

Table 3. Plagas Claves en Los Cultivos Principales del DLDP/ATAC Proyecto en El Salvador. (Cont'd.)

CULTIVO	PLAGA	CONTROL QUIMICO	ALTERNATIVA	IPM
MELON PEPINO SANDIA	DIAPHANIA	PERMETRINA CIPERMETRINA METOMIL	B.T.	- -
	LIRIOMYZA	OXAMIL	B.T.	- -
	APHIS	METAMIDOFOS	- -	- -
		ENDOSULFAN	- -	- -
	BEMISIA	METAMIDOFOS ENDOSULFAN	ACIETE STYLETE	
	NEMATODES	CARBOFURAN		
	PSEUDOPE- RONOSPORA	MANCOZEB MANZATE DITHANE	- -	- -
	MYCOSPHAE- RELLA	BENOMIL RIDOMIL	- -	- -
	Comentarios: Problems with Nematodes in areas where they previously had grown Musaceas.			
MANI	DIABROTICA	PARATION METILICO	SEVIN TALSTAR	- -
	ESTIGMENE	METOMIL METAMIDOFOS	B.T.	
	CERCOSPORA	MANCOZEB HIDROXIDO DE COBRE	- -	- -
		BENOMIL	- -	
	MALEZAS	GRAMOXONE	GLIFOSATO	- -

Table 3. Plagas Claves en Los Cultivos Principales del DLDP/ATAC Proyecto en El Salvador. (Cont'd.)

CULTIVO	PLAGA	CONTROL QUIMICO	ALTERNATIVA	IPM
PAPA	LIRIOMYZA	METAMIDOFOS	- -	- -
TOMATE		MALATION	- -	- -
		DIAZINON		
		LEBAYCIDA	- -	- -
	TORTUGUILLA	PARATION METILICO	PERMETRINA CPERMETRINA	- - - -
	SPODOPTERA	METOMIL B.T.	PIRETROIDES	
	EPITRIX	METOMIL METIL PARATION	PIRETROIDES	
	BEMISIA	METAMIDOFOS PARATHION METILICO, ENDOSULFAN	TALSTAR	
	PHYTOPH-THORA	DACONIL MANCOZEB	- -	
	MALEZAS	DINTHANE SENCOR		
CHILE	ANTHONOMUS	METIL PARATION	TALSTAR	COLECCION FRUTOS EPOCA APLICACION
	MYZUS	MALATION	THIODAN	- -
	EPITRIX	MALATION	SEVIN	- -
	TORTUGUILLA	PARATION METILICO	SEVIN	- -
	PHYTOPTHORA	HIDROXIDO DE COBRE MANCOZEB	- -	- -
	VIROSIS	CONTROL DEL VECTOR	- -	- -

Nota: Tanto pequeños como medianos agricultores hacen uso de Gramoxone para quemar malezas antes de la siembra o en aspersiones dirigidas para el control de malezas en cultivos ya establecidos.

MOST FREQUENTLY USED PESTICIDES BY COOPERATIVES ASSOCIATED WITH AIFLD/DLDP PROJECT

INSECTICIDES		
1	Methyl parathion	Folidol
	Phoxim	Volatón 2.5 G
2	Methamidophos	Tamarón, MTD 600
3	Methomyl	Lannate, Methovin
	Chlorpyrifos	Agromil, Lorsban
	Monocrotophos	Nuvacrón
	Permethrin	Ambush
	Carbosulfan	Marshall
	Endosulfan	Thiodan
HERBICIDES		
	Glyphosate	Látigo
3	Propanil	Herbax, Stam
1	Paraquat	Gramoxone
	Edifenphos	Hinosan
	Bentazon	Basagran
	Pendimethalin	Prowl
2	2,4-D	Hedonal, Amina, Expronal 72
	Picloram	Tordon 101
	Alachlor	Lazo
FUNGICIDES		
	Metalaxyl	Ridomil
	Benomyl	Benlate
	Kasugamycin	Kasumin
	Propineb	Antracol
1	Mancozeb	Dithane
2	Copper Oxychloride	Cupravit Verde
	Fosetyl - Al	Aliette
3	Bayfolaton	Bayfidan
	Manzate 200	

APPENDIX 7.

a. Letter from DIVAGRO Requesting MAG/DDA Sanctions for Pesticide Applicator Certification Program

b. Portion of Draft of New MAG/DDA Pesticide Law Dealing with Pesticide Applicator Certification Program

c. Portion of Draft of New MAG/DDA Pesticide Law Dealing with Pesticide Applicator Certification Program

FUNDACION SALVADOREÑA
PARA EL DESARROLLO ECONOMICO Y SOCIAL

Ref. 01-7291

San Salvador, Julio 23 de 1991.

Dr. Rolando Martínez Melara,
Dirección de Defensa Agropecuaria,
Presente.

Estimado Dr. Martínez Melara:

Por este medio hago referencia a nuestra reciente conversación sobre los cursillos "Manejo Racional de Plagas y Plaguicidas" que la Gerencia de Calidad Integral de FUSADES/DIVAGRO ofrece anualmente, y que culmina en la expedición de un carnet que certifica a los asistentes que aprueban el examen teórico-práctico con nota mínima de 7.0 como "capacitados para supervisar el manejo seguro de plaguicidas agrícolas incluyendo los de uso restringido".

Como antecendentes, la primera vez que fueron ofrecidos los cursillos, en 1990, contamos con la asistencia técnica de la Escuela Agrícola Panamericana. Ese año se extendieron 34 certificados. Desde entonces, hemos modificado parte del material didáctico y hemos capacitado a nuestros propios técnicos, en la Sección de Asistencia Técnica de Calidad Integral, para impartir los cursillos. Debo agregar que el hecho de que DIVAGRO cuenta también con parcelas experimentales dotadas de espacio y equipos para las secciones teóricas y prácticas del cursillo, nos capacitan plenamente para efectuar una labor de enseñanza apropiada. El primer cursillo del presente año 1991 fue ofrecido durante la segunda semana de Julio, y el segundo lo será en la última semana también de este mes de Julio. Con el objeto de proporcionarle a Ud. una idea más completa de los alcances del cursillo, que dura cinco días, adjunto copias del material didáctico que se distribuye a los participantes, así como de algunos de los exámenes teóricos que han sido usados y del certificado o carnet que extendemos a quienes completan exitosamente el cursillo. Adicionalmente, podríamos aprovechar el cursillo que se ofrecerá a fines de Julio para que un representante de Defensa Agropecuaria asistiera a todo o parte del cursillo como observador. Cabe mencionar que los cursillos están dirigidos a personal técnico medio y alto (Agrónomo o más elevado) y que los certificados son válidos por un año.

Considerando que dichos cursillos llenan una importante función en el desarrollo agrícola del país, que son de interés nacional para los sectores público y privado, y que además

EDIFICIO LA CENTRO AMERICANA 6º PISO, APTDO. POSTAL 01-278, SAN SALVADOR 011, EL SALVADOR, TELS.: 24-3975 Y 24-5636, FAX: (503) 23-4723, TELEX: 20438
WORLD TRADE CENTER, 80 SW 8TH STREET, SUITE 2150, MIAMI, FLORIDA 33130, TEL.: (305) 381-8940, FAX: (305) 381-9866, TELEX: 6503481589 MCI UW

contribuyen a la labor de la Dirección de Defensa Agropecuaria, atentamente solicito de Ud. que se considere la posibilidad de darle a tales certificados un aval oficial. Este podría consistir en un sello estampado por su Direccón en el carnet extendido por FUSADES/DIVAGRO. De ser necesario, el certificado, diseñado para ser emplasticado después de recibir la fotografía del titular, podría ser rediseñado en el futuro. Los certificados son válidos por un año y pueden ser revalidados si el titular se somete anualmente al examen teórico.

Esperando que nuestra propuesta reciba una respuesta favorable, y confiando en que ésta constituya una oportunidad más para una colaboración contínua y estrecha entre nuestros programas, quedo de Ud. con un cordial saludo.

Atentamente,

Dr. Ricardo A. Molins,
Gerente Calidad Integral
DIVAGRO/FUSADES

c.c. Ing. Agustín Martínez

Certifica que:

está capacitado para supervisar el manejo seguro de plaguicidas agrícolas incluyendo los de uso restringido.

CARNET	VENCE:

FIRMA AUTORIZADA

FIRMA DEL APLICADOR

MINISTERIO DE AGRICULTURA Y GANADERIA
DIRECCION DE DEFENSA AGROPECUARIA
25 CALLE PONIENTE No. 1505 SAN SALVADOR
TELEFONOS: 25-8414, 25-4031, 25-6319

REF. DDA-I.

No. 225.

San Salvador, 25 de julio de 1991.

Dr. RICARDO A. MOLINS,
Gerente Calidad Integral
DIVAGRO/FUSADES.

Estimado Dr. Molins:

En atención a su atenta nota 01-7291 de fecha 23 de julio de 1991, relacionada con los cursillos "Manejo Regional de Plagas y Plaguicidas" que la Gerencia de Calidad Integral de FUSADES/DIVAGRO ofrece anualmente y que culmina con la expedición de un carnet que certifican a los que aprueban un examen teórico práctico.

Nos satisface mucho su interés por realizar este tipo de actividades para capacitar en manejo seguro de plaguicidas. Así también, hemos conocido el material que se entrega a los participantes, el cual contiene toda la información necesaria, expuesta en forma didáctica.

Sin lugar a dudas, consideramos que estos cursillos contribuyen significativamente al desarrollo agrícola y a la labor que lleva a cabo la Dirección de Defensa Agropecuaria.

En cuanto al aval oficial de los Certificados estamos de acuerdo en otorgarlo, toda vez que participe un delegado de nuestra Institución a tales eventos.

Aprovechando su invitación al cursillo que se efectuará a fines de julio, hemos delegado al Señor MEDARDO JOVEL RODRIGUEZ, Encargado de la Unidad de Control de Calidad de Registro y Certificaciones, para que participe en calidad de observador.

Sin otro particular, válgome de la ocasión para reiterarle las muestras de mi especial aprecio y consideración.

Dr. ROLANDO MARTINEZ MELARA, M.
Director.

MINISTERIO DE AGRICULTURA Y GANADERIA
DIRECCION DE DEFENSA AGROPECUARIA
DIRECTOR
San Salvador, El Salvador, C.A.

/gal.

INSTITUTO INTERAMERICANO DE COOPERACION PARA LA AGRICULTURA

PROGRAMA DE SANIDAD VEGETAL

AREA CENTRAL

COMISION AD-HOC PARA LA ELABORACION DEL DOCUMENTO BASE DE REGLAMENTO SOBRE EL REGISTRO, COMERCIALIZACION Y CONTROL DE PLAGUICIDAS AGRICOLAS Y SUSTANCIAS AFINES

PROYECTO DE REGLAMENTO SOBRE REGISTRO, COMERCIALIZACION Y CONTROL DE PLAGUICIDAS AGRICOLAS Y SUSTANCIAS AFINES.

ORGANISMO INTERNACIONAL REGIONAL DE SANIDAD AGROPECUARIA
MEXICO – CENTROAMERICA – PANAMA
DEPARTAMENTO DE SANIDAD VEGETAL

SAN PEDRO SULA - HONDURAS
25-28 FEBRERO, 1985

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en el reglamento respectivo.

Art. 136 Toda persona natural o jurídica que importe, fabrique, formule y reempaque plaguicidas declarados de uso restringido está obligada a llevar un registro de la existencia de dichos productos.

En el registro debe constar el nombre genérico y comercial del producto, tipo de formulación fecha de elaboración y cantidad de plaguicida importado, fabricado, formulado o empacado, así como la cantidad y destinatario a quién se le venda posteriormente el producto.

Art. 137 Toda persona natural o jurídica que comercie plaguicidas de uso restringido está obligada a llevar un registro en el que se indique el nombre genérico y comercial del producto, tipo de formulación y cantidad de producto adquirido y destinatario de los productos vendidos.

Art. 138 La compra de un plaguicida de uso restringido solo puede realizarse si el usuario está autorizado mediante una receta profesional, extendida por un miembro autorizado del Colegio de Agrónomos y presenta una constancia extendida por el Ministerio para aplicar plaguicidas de uso restringido.

Art. 139 La selección del equipo de aplicación de plaguicidas de uso restringido debe ser indicado por la persona que emita la receta profesional y el cumplimiento de dicha disposición es responsabilidad del aplicador.

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APPENDIX 8.

Selected Pesticide Prices in El Salvador

LISTA DE PRECIOS 2/89 - TEMPORADA 1989 - 1990

PRODUCTO	ENVASE	PRECIO PUBLICO
INSECTICIDAS		
ABATE	25 Kgs.	₡ 16.40 Kgo.
	1 Lba.	8.25 Lba.
ARRIVO 60	18/19 Ltr.	79.60 Ltr.
	1 Ltr.	86.10 Ltr.
	100 cc.	18.40 Uni.
ARRIVO 300	18/19 Ltr.	254.90 Ltr.
	1 Ltr.	268.60 Ltr.
BASUDIN 60	50 Ltr.	88.10 Ltr.
	5 Ltr.	89.10 Ltr.
	1 Ltr.	94.70 Ltr.
	100 cc.	21.00 Uni.
BACTOSPEINE	1/2 Kg.	62.95 Uni.
BELATION 57%	208 Ltr.	26.80 Ltr.
	19 Ltr.	28.30 Ltr.
	1 Gal.	124.85 Gal.
	1 Ltr.	35.35 Ltr.
BELLOTION 48 EC	19 Ltr.	31.35 Ltr.
	1 Gal.	122.95 Gal.
	1 Ltr.	36.75 Ltr.
BELLOTION M-2	1 Lba.	2.75 Lba.
	50 Lbs.	1.90 Lba.
BROMURO DE METILO	1 1/2 Lba.	16.80 Uni.
LANNATE 90%	1/2 Lba.	125.30 Lba.
	100 Grs.	29.75 Uni.
LANNATE L	20 Ltr.	54.15 Ltr.
	1 Ltr.	55.70 Ltr.
	1/2 Ltr.	28.95 Uni
MTD-600	208/200 Ltr.	54.35 Ltr.
	18/20 Ltr.	55.50 Ltr.
	1 Gal.	216.75 Gal.
	1 Ltr.	60.25 Ltr.
	1/2 Ltr.	30.55 Uni.

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Cont. Lista de Precio

PRODUCTO	ENVASE	PRECIO PUBLICO
MIREX 450	1 Lba.	ℓ 16.00 Lba.
NUVACRON 60	200 Ltr.	53.50 Ltr.
	20 Ltr.	54.70 Ltr.
	1 Ltr.	55.95 Ltr.
	1/2 Ltr.	30.25 Uni.
POUNCE 75	19 Ltr.	65.40 Ltr.
	1 Ltr.	70.30 Ltr.
VYDATE L	200 Ltr.	109.70 Ltr.
	20 Ltr.	112.50 Ltr.
	4 Ltr.	114.65 Ltr.
	1 Ltr.	114.70 Ltr.
	1/2 Ltr.	57.95 Uni.
	100 cc.	21.80 Uni.
HERBICIDAS		
AMINA 2-4-D (6lbs)	200 Ltr.	28.75 Ltr.
	20 Ltr.	28.75 Ltr.
	1 Gal.	114.40 Gal.
	1 Ltr.	30.25 Ltr.
ARSENAL	1 Gal.	974.10 Gal.
	1 Ltr.	271.76 Ltr.
AVIROSAN 500	50 Ltr.	45.20 Ltr.
	4 Ltr.	49.40 Ltr.
COTORAN 80	20 Kgs.	87.60 Kgo.
DUAL 960 EC	20 Ltr.	96.70 Ltr.
	1 Ltr.	99.90 Ltr.
DIURON 80	25 Kgs.	55.95 Kgo.
	3 Lbs.	26.60 Lba.
GARDOPRIM 500	20 Ltr.	47.25 Ltr.
GESAPAX	20 Kgs.	75.70 Kgo.
	2 Kgs.	78.55 Kgo.
GESAPRIM 80	20 Kgs.	44.70 Kgo.
	2 Kgs.	45.60 Kgo.
	1 Kgo.	46.65 Kgo.

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Cont. Lista de Precio

PRODUCTO	ENVASE	PRECIO PUBLICO
GESAPRIM 500	5 Ltr.	₡ 30.80 Ltr.
GRAMOXONE	5 Ltr.	26.50 Ltr.
	1 Ltr.	28.50 Ltr.
HERBAX LV-30	55 Gal.	136.00 Gal.
	5 Gal.	136.00 Gal.
	1 Gal.	143.00 Gal.
LATIGO	20 Ltr.	27.85 Ltr.
	4 Ltr.	27.85 Ltr.
	.75 Ltr.	21.85 Uni.
KARMEX	50 Lbs.	25.40 Lba.
	3 Lbs.	26.60 Lba.
PROWL 500	19 Ltr.	86.95 Ltr.
	1 Gal.	346.00 Gal.
ROUNDUP	2 1/2 Gal.	994.60 Uni.
	1 Gal.	397.85 Gal.
	1 Ltr.	115.45 Ltr.
VELPAR 90	50 Lbs.	193.60 Lba.
	2 Lbs.	199.65 Lba.
FUNGICIDAS		
BENLATE	1 Kgo.	199.75 Kgo.
	1 Lba.	93.25 Lba.
	1/2 Lba.	46.80 Uni.
CLORTOSIP 75	1 Kgo.	87.70 Kgo.
KOCIDE 101	20 Lbs.	12.55 Lba.
	2 Lbs.	13.20 Lba.
MANZATE 200	1 Kgo.	34.10 Kgo.
RIDOMIL MZ-58	1 Kgo.	141.00 Kgo.
	1 Lba.	65.05 Lba.
RIDOMIL MZ-72	1 Kgo.	131.95 Kgo.
RIDOMIL 5-G	25 Kgs.	58.95 Kgo.
	1 Kgo.	59.95 Kgo.

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Cont. Lista de Precios

PRODUCTO	ENVASE	PRECIO PUBLICO
SURFACTANTES		
PEGAMAX	200 Ltr.	₡ 15.30 Ltr.
	20 Ltr.	16.95 Ltr.
	1 Gal.	62.85 Gal.
	1 Ltr.	18.25 Ltr.
	1/2 Ltr.	10.15 Ltr.
FERTILIZANTES FOLIARES		
TACREMENTO	100 Lbs.	14.30 Lba.
	50 Lbs.	14.30 Lba.
	1 Lba.	15.10 Lba.
TACREFOL 20-20-20	50 Lbs.	7.30 Lba.
	5 Lbs.	9.50 Lba.
TACREFOL 16-32-16	50 Lbs.	7.50 Lba.
	5 Lbs.	9.60 Lba.
WUXAL 8-8-6	200 Ltr.	10.75 Ltr.
	20 Ltr.	11.95 Ltr.
	1 Gal.	45.35 Gal.
	1 Ltr.	15.25 Ltr.
	1/2 Ltr.	8.00 Uni.
FERTILIZANTES		
BLAUKORN	5 Lbs.	13.00 Bolsa
EQUIPOS		
BOMBAS MIL USOS	Unidad	21.00 Uni.
APLICADORES BROMURO DE METILO	Unidad	99.90 Uni.
BOMBAS PTP-16	Unidad	430.25 Uni.
PICADORAS DE ZACATE		
MODELO T-30-1 Con Motor	Unidad	5,000.00 Uni.
MODELO T-80-1.25 Con Motor	Unidad	8,000.00 Uni.