SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT OF PEST MANAGEMENT AND PESTICIDE USE IN THE PRIVATE VOLUNTARY ORGANIZATION SUPPORT PROJECT OF USAID/MOZAMBIQUE

Supplemental to the Programmatic Environmental Assessment of the USAID/Mozambique Transition Development Program

VOLUME I.

U.S. Agency for International Development
USAID/Mozambique
Maputo, Mozambique

January 1994

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VOLUME I.

Prepared By

Herbert H. Fisher, Team Leader
Pesticide Management, Evaluation and Training Specialist
International Agricultural Consultant
821 N.W. Edgewood Place
Albany, Oregon 97321/USA

Patricia C. Matteson, IPM Specialist
Pest Management Consultant and Departmental Collaborater
Department of Entomology
Iowa State University
Ames, Iowa 50011-3140/USA

and

Walter I. Knausenberger
Environmental Advisor
Division of Food, Agriculture and Resources Analysis
Office of Analysis, Research and Technical Support
U.S. Agency for International Development
Washington, D.C. 20523-0089

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AGENCY FOR INTERNATIONAL DEVELOPMENT
BUREAU FOR AFRICA
Office of Analysis, Research and Technical Support
AFR/ARTS/FARA
Washington, DC 20523-0089

SUPPLEMENTARY ENVIRONMENTAL ASSESSMENT (SEA)

APPROVAL FORM

COUNTRY:	Mozambique
TITLE OF ASSESSMENT:	Supplementary Environmental Assessment of Pest Management and Pesticide Use in the PVO Support Project, USAID/Mozambique.
PROJECT TITLE:	Private Voluntary Support Project, 656-0217 (1990-1997)
SEA PREPARED BY:	Herbert Fisher, Patricia Matteson, and Walter I. Knausenberger
ASSESSMENT DATES:	September - November 1993

RECOMMENDATION:

The SEA is recommended for approval with the understanding that it, with the Programmatic Environmental Assessment of the Transition Program, will be the basis of guidance to implementation of PVO/NGO activities so as to avoid and mitigate potential short-term and long-term environmental impacts.

RECOMMENDED BY:
Walter I. Knauserberger, Ph.D.,
AFR/ARTS/FARA/ENV, Environmental Advisor

CONCURRENCE:
John J. Gaudet, AFR/ARTS/FARA
Africa Bureau Environmental Officer

Approval: ✓

Disapproval: _____

Date: 5/2/94

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ACRONYMS AND ABBREVIATIONS

ADI	Acceptable Daily Intake (of pesticide residue)
ADRA	Adventist Development and Relief Agency, International
AFR/AA/DRCO	USAID's African Disaster Response Coordination Office
A.I.D.	U.S. Agency for International Development
ATLAS	African Training for Leadership and Advanced Skills
AVRDC	Asian Vegetable Research and Development Center
BOROR	Defunct state-owned agrochemical distributing company, Mozambique
B.t.	A natural pathogen, *Bacillus thuringiensis*, commercially available as an insecticide, effective only against caterpillars, and safe for people and non-target organisms. Produced under many trade names (Biotrol, Dipel, Bactospeine, etc.)
CAFUM	Mozambican pesticide distributor
CARE	Cooperative for American Relief Everywhere = CARE International
CFA	Centro de Formaçao Agraria (Center for Agrarian Training)
CFR	U.S. Code of Federal Regulations
CGIAR	Consultative Group for International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture)
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (International Center for The Improvement of Maize and Wheat)
CIP	Centro Internacional de la Papa (International Potato Center)
CIRAD	Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement
CNA	Comissao Naçional do Ambiente (National Environmental Commission)
CPFA	Centro Provincial de Formaçao Agraria (Provincial Center for Agrarian Training)
DASP	Departamento de Agricultura e Sistemas de Produçao (Dept. of Agriculture and Production Systems))
DANIDA	Danish International Development Agency
DDA	District Department of Agriculture
DHA	Departamento de Higiene Ambiental (Dept. of Environmental Hygiene)
DLCO-EA	Desert Locust Control Organization-East Africa
DNFFB	National Directorate of Fish and Wildlife Resources -- MOA
DNDR	Direcçao Nacional de Desenvolvimento Rural (National Directorate for Rural Development)
DSV	Departamento de Sanidade Vegetal (Plant Protection Department)
EMOP	Empresa Moçambicana de Pesticidas a Parastatal
EPA	U.S. Environmental Protection Agency
FAO	Food and Agriculture Organization of The United Nations
FHI	Food for The Hungry, International
GIFAP	International Association of Manufacturers of Agrochemical Products
GRM	Government of The Republic of Mozambique

GTA	Grupo de Trabalho no Ambiente (Environmental Working Group)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German overseas technical assistance agency)
GUP	General Use Pesticide (U.S. EPA)
ha	hectare (10,000 sq. m., 2.47 acres)
HRDA	Human Resources Development Assistance Project (USAID)
IARC	International Agricultural Research Center (one of nearly 20 such centers funded by the Consultative Group on International Agricultural Research)
ICIPE	International Centre of Insect Physiology and Ecology
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IITA	International Institute of Tropical Agriculture
INTERQUIMICA	Mozambique state-owned agrochemical importing company
INIA	Instituto Naçional de Investigaçao Agronomica (National Institute of Agronomic Research)
IPM	Integrated pest management
IRLCO-CSA	International Red Locust Control Organization--Central Southern Africa
kg	kilograms
LC50	Term used to describe pesticide toxicity from inhalation of fumes or gas, or to fish in water, expressed in mg per liter or parts per million that cause 50% mortality
LD50	Term used to describe pesticide toxicity from ingestion or absorption through the skin. A statistical estimate of the amount of pesticide in mg per kg of body weight required to kill 50% of the population of test animals, generally rats for ingestion and rabbits for absorption
LNHAA	Laboratorio Naçional de Higiene de Agua e Alimentos
LOMACO	Joint agribusiness venture of the GRM and Lonrho-London
mg	milligrams
MOA	Ministry of Agriculture (Mozambique)
MOF	Ministry of Finance
MOH	Ministry of Health
MOT	Ministry of Transportation
MRL	Maximum Residue Limit (of a pesticide)
NARS	National Agricultural Research System
NEAP	National Environmental Action Plan
NEMP	National Environmental Management Program
NGO	Non-Governmental Organization
OMM	Organization of Mozambican Women
PACD	Project Assistance Completion Date (USAID)
PDA	Provincial Directorate for Agriculture
PEA	Programmatic Environmental Assessment (USAID)
PCM	Pesticide management
PESTNET	ICIPE-coordinated Pest Management Research and Development Network

PIN	Pesticide Information Network (of the U.S. EPA Office of Pesticide Programs)
PPE	Personal Protective Equipment (for pesticide safety)
PRS	Pesticide Registration Section (of the MOA-DSV)
PSSP	Private Sector Support Project (USAID/Mozambique)
PVO	Private Voluntary Organization
RES	Rural Extension Service
RUP	Restricted Use Pesticide (by U.S. EPA)
SACCAR	Southern African Centre for Cooperation in Agricultural Research and Training
SADC	Southern African Development Conference
SCF	Save The Children Federation
SEA	Supplemental Evironmental Assessment
SEMOC	Sementes Moçambicanas (state-owned seed R&D company)
SMS	Extension Subject Matter Specialist
UEM	Universidad Eduardo Mondlane
ULV	Ultra-low Volume
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
USAID/M	United States Agency for International Development in Mozambique
USAID/W	U.S. Agency for International Development in Washington, D.C.
USEPA	U.S. Environmental Protection Agency (also EPA)
WARDA	West Africa Rice Development Association
WHO	World Health Organization, a United Nations agency
WRI	World Relief International
WVRD	World Vision Relief and Development, Inc.

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The authors thank the many persons who graciously gave us time from busy schedules, and useful information. Without them, this Supplemental Environmental Assessment could not have been done. Those persons are too many to mention individually, but by and large they are included in the 85 plus people listed in the "Collaborators and Persons Contacted" section below.

Special thanks are extended to the USAID/Mozambique personnel, especially Robin Mason, Scott Hudson and Darell McIntyre. We also appreciate the support of Acera Mogy who arranged our interviews, flight schedules, etc., and of the drivers who helped us keep our appointments.

The PVO directors and field supervisors were especially helpful. We are most grateful to Buck Deines of Food for The Hungry International and Lesley Sitch of World Vision Relief and Development for spending time in the field showing us their research and extension projects, as well as the "deslocados" crop protection problems. We regret that lack of time did not allow us to visit the agricultural programs of the other PVOs.

Many other persons kindly provided information during our field visits. In particular we thank the smallholder farmers who took time away from their many tasks to tell us about their pest management constraints, and shared their farming ideas with us.

And, in the U.S., we thank the many persons from the EPA and other organizations who provided us with up-to-the-minute information on topics such as pesticide registration status and botanical and biorational pesticides.

1.0 EXECUTIVE SUMMARY

This Supplemental Environmental Assessment (SEA) of Pest Management and Pesticide Use in The Private Voluntary Organization (PVO) Support Project complements the Programmatic Environmental Assessment (PEA) of The USAID/Mozambique Transition Program, (Knausenberger 1993, Russell et al. 1993). The PEA did not cover pesticides. Because some of the PVOs in the PVO Support Project seek permission from the USAID/Mozambique Mission to use pesticides in their expanding agricultural development programs, it was necessary to conduct an environmental assessment of the Project to examine current and probable future pest control and pesticide management aspects of Project PVO activities, and how they might affect the human health and the natural environment of Mozambique. This SEA is also complementary to the SEA for Potential USAID Assistance to Locust/Grasshopper Control Operations in Mozambique (Belayneh 1993).

Information given herein is intended for the use of: 1) the USAID/Mozambique Mission; 2) the PVOs of the PVO Support Project; 3) the Plant Protection Service (DSV) of the Ministry of Agriculture (MOA) and attached Pesticide Registration Section (PRS) assisted by the Danish International Development Agency (DANIDA); and 4) other relevant entities in Mozambique, for the design, implementation and monitoring of sound pest and pesticide management programs for PVOs. This SEA may need to be amended as new pertinent information becomes available in the rapidly changing development scenario of Mozambique.

The PVO Support Project seeks to reduce vulnerability to the absolute poverty induced by years of hardship and disruption during the Mozambican civil war, which ended in October, 1992. The project focusses on small-scale programs which are evolving from short-term, acute emergency aid to activities that lay the foundation for future development. Most PVO beneficiaries are farmers who are just resettling or returning home and must be helped toward productivity and self-reliance. Seven project PVOs have agricultural programs and conduct adaptive agricultural research and/or agricultural extension: Food for the Hungry International; World Vision Relief and Development, Inc.; CARE; Save the Children Federation; Adventist Development and Relief Agency (ADRA); World Relief International (WRI); and Africare. It is likely that more PVOs with agricultural initiatives will be involved in the future.

Availability of Pesticides in Mozambique

At the moment, commercial pesticides are neither available nor affordable for most smallholder farmers in Mozambique. Farmers and PVOs have been relying chiefly on alternative pest control methods, including homemade pesticides based on soap, chili, tobacco, etc. These measures are not always satisfactory, and there is a general favorable inclination towards using pesticides. Now that Mozambique is allowing chemical companies to operate freely, and there is a sharp upswing in agricultural development efforts by the government and other organizations (including USAID), a rapid increase in pesticide use by the smallholder sector appears inevitable.

Farmers are unfamiliar with pesticide-related risks and there is great potential for pesticide misuse. Government enforcement of pesticide registration and management regulations is currently almost nonexistent and government extension systems serving smallholder

farmers are nonfunctional. Not only do most rural people have no access to information or training that would equip them to use pesticides safely, but war has destroyed government public health services, so treatment and antidotes for pesticide poisoning will probably be unavailable from that source for some time. Pesticide misuse could endanger the environment; persistent organochlorines such as DDT, though not registered, are still in circulation. *Because it is not likely that the Government of Mozambique will be able to enforce its pesticide legislation effectively in the near future, much of the responsibility for safe and effective pesticide use by PVOs must be borne by the PVO Support Project and the PVOs themselves.*

Reasons for Permitting Pesticide Use

Permission to use pesticides is being granted to project PVOs for two reasons. First, safe and judicious pesticide use may be a valuable tool for enhancing smallholder farmers' productivity and standard of living. Secondly and perhaps more important, PVOs are generally responsible at the moment for all extension activities in their areas of operation, so without their guidance there will be little likelihood of correct and effective pesticide application and almost no possibility of mitigating the attendant hazards, Moreover, PVO extension activities are to serve as a model for government programs and seconded government extension agents are receiving in-service training through their employment by PVOs. If those extension agents do not gain knowledge, skills and training experience with regard to safe and proper pesticide use in an IPM context, and to pesticide-related health and environmental hazards and enforcement of regulations, then they will not be prepared to discharge their rural development duties adequately.

Integrated Pest Management (IPM)

This SEA applies USAID Environmental Procedures (22 CFR, Section 216) to the entire country of Mozambique and to a broad range of current and potential PVO agricultural pesticide use patterns. It emphasizes the necessity of conducting pest and pesticide management according to integrated pest management (IPM) principles, which safeguard human health and the environment by minimizing pesticide use while maintaining productivity. IPM systems achieve effective, sustainable and economic pest management by relying as much as possible on ecological (non-chemical) pest control methods. Pesticides will be employed by PVOs in adaptive research and extension only when available non-chemical pest control methods have been investigated and found inadequate for satisfactory pest control.

Least-toxic pesticides may be recommended to smallholder farmers only after the pesticide use in question has been shown to be cost-effective under local conditions. Insecticides will not be applied to crops on a preventive or calendar basis, but rather only when field monitoring finds that pest infestations have reached an "action threshold" that has been shown to justify application.

No Pesticide Subsidies

In Mozambique USAID is seeking to promote sustainable agriculture and increased development of the private sector supplying agricultural inputs. Government and donor pesticide subsidies undermine both. Except for very limited experimentation and demonstration purposes and ad hoc emergency assistance, *project PVOs should not provide free or subsidized pesticides or pesticide application to farmers.* USAID should monitor the provision of agricultural inputs at the national level and discourage any pesticide subsidies through its policy dialogue activities.

PVOs should not support the establishment of local-level rapid intervention teams or village brigades for emergency pesticide application, which also is a form of subsidy. Experience in other African countries has been that such programs are unsustainable, and that mismanagement is endemic and fosters dangerous pesticide misuse and dependency on pesticides while the free applications divert interest from more sustainable alternative measures . In the event of widespread pest outbreaks PVOs should assist farmers to the extent possible while summoning help from the national Plant Protection Department (DSV) and cooperating regional organizations created to handle such emergencies (see Sect. 4.1.4). For grasshopper and locust operations involving USAID assistance, reference should be made to Belayneh (1993).

Mitigative Measures

PVOs that use and extend pesticides must implement appropriate mitigative measures, and compliance will be monitored on an ongoing basis. They are to use only registered products that are considered relatively safe if applied by properly trained and supervised people, and the SEA provides pesticide choice guidelines and authorization procedures. All users of pesticides in PVO programs, including field laborers and farmer beneficiaries, must be trained in IPM and pesticide safety and management. Training courses should be tailored to meet the needs and characteristics of all sectors of the community who have a role with relation to crop production and protection, and assistance from a specialist consultant in participatory non-formal adult education is recommended.

Highly toxic pesticides may be applied for internal project operations only (e.g. seed multiplication) and only if there is no suitable alternative. Such dangerous products may be applied only by, or under the direct supervision of, PVO staff who have passed an intensive pesticide applicator course, with periodic refresher training and re-testing.

Pesticide-free buffer zones are to be maintained around forested areas, sensitive habitats and legally protected wildlife zones.

Botanical Pesticides

PVOs have been demonstrating botanical pesticide solutions made at village level from locally-available poisonous plants, many of which have not undergone safety testing.

Plant-derived pesticides not registered by the U.S. EPA cannot be extended to farmers or promoted commercially with USAID funds, so PVOs will have to confine their recommendations to registered products. *Nicotine-based products have been removed from the market in the U.S. and, therefore, pesticide solutions made with tobacco should not be recommended to farmers.* A list of approved botanical products is provided (Table 7).

Technical Assistance Needs

The Government of Mozambique needs training support and technical and material assistance from USAID and other international agencies for developing its pesticide management and related public health and environmental protection capabilities. The requisite pesticide quality control and residue analysis laboratories must be expanded and equipped. PVOs should assist with government and donor environmental monitoring programs as a check on the effectiveness of their pesticide hazard mitigation measures.

Better Liaison for Technical Support & Training

PVOs' effectiveness with non-chemical pest control has been limited by lack of communication both among themselves and between them and the many national and international sources of relevant information and expertise. Some of those resources are described in this document. Notable among them is the DSV, which is being reinforced by a well-staffed and multifaceted DANIDA project. The DSV has recently produced IPM manuals for major food crops, has an active Migratory Pests Unit, is implementing the national pesticide registration program, and is to assume responsibility for pest and pesticide management technical support and training for the government extension system.

An annual national-level IPM workshop is proposed to facilitate better communication and collaboration between PVOs and between them and their government counterparts regarding policy, technical information, cooperative research and training. It is also recommended that USAID/W convene a series of regional workshops for African PVOS, to provide a forum for policy discussions and networking.

Pesticide Resistance Avoidance

At present the synthetic pyrethroid insecticides which are being used for malaria vector control in Mozambique are also being used widely in agriculture, including aerial applications in cotton-growing areas. This increases the likelihood that malaria mosquitoes will escape control through the development of pesticide resistance. To prevent malaria resurgence, certain suitable insecticides should be reserved exclusively for malaria control.

2.0 SCOPE AND PURPOSE OF THIS SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT (SEA)

2.1 Introduction

A Programmatic Environmental Assessment (PEA) was carried out for the USAID/Mozambique Transition Development Program in June/July 1993 (Krausenberger 1993, Russel et al. 1993). This program is a broad-based effort to support Mozambique's transition from emergency relief to long-term development. Within the program, drought/emergency aid (including emergency food assistance under the PL480 Title II and Title III Programs and the distribution of seeds and farm tools by Private Voluntary Organizations (PVOs)) is coupled with support for the peace process and for health- and agriculture-related development activities.

The USAID/Mozambique Mission's goal is to ensure access for all Mozambicans at all times to sufficient food for a healthy and productive life. This goal is to be achieved through meeting the food subsistence and basic health requirements of the absolute poor and by increasing food supplies through production and trade to levels that meet domestic needs. The Regional Railroad System Support Project is intended to allow the Mozambican rail system to operate on a commercial basis. Rehabilitation of war victims and of the health care system are being addressed by the Prosthetics Assistance Project, the Primary Health Care Support Project, and the PVO Support Project. USAID agricultural development-related projects/programs include policy dialogue and commodity import support (Private Sector Support Program/Project and PL 480 Title III Program) and grants to PVOs for agricultural development initiatives (PVO Support Project). Training to increase Mozambicans' leadership abilities and technical skills is provided through the African Training for Leadership and Advanced Skills (ATLAS) Project (long-term training) and the Human Resources Development Assistance (HRDA) Project (short-term training).

USAID/Mozambique is requesting authorization and guidance for the use of pesticides under the Transition Development Program, which requires an Environmental Assessment. However, the recently-completed PEA (Russel et al. 1993) did not cover that area of concern, on the understanding that the issue would be covered separately. Accordingly, two concurrent but separate Supplementary Environmental Assessments (SEAs) were conducted to authorize and guide pest and pesticide management activities undertaken with USAID funding in Mozambique:

PVO Support Project. The present Supplemental Environmental Assessment was initiated to cover all actual and potential pest and pesticide management activities carried out under the USAID/Mozambique Transition Development Program, and is a Supplement to that Program's PEA, completed in September 1993. USAID/Mozambique Mission officers concurred in limiting this SEA's focus to the PVO Support Project, because that is the only part of the entire Transition Program *per se* which will deal with pest management and pesticides. The current level of pesticide use is low, involving perhaps a few thousand dollars' worth within the entire $90 million PVO Support project (Darell McIntyre, pers.

comm.). However, this SEA was initiated because, as explained in the following sections, (a) crop losses to pests appear to significantly reduce the potential for crop production in Mozambique, (b) it is anticipated that as PVOs and NGOs increasingly become involved in agricultural development, the use of pesticides will increase, and (c) there are many opportunities to introduce alternative pest management strategies. Whenever U.S. government assistance is involved in matters relating directly or indirectly to pesticide use, an environmental examination is called for. The present SEA is an innovative response to the needs of a diverse PVO Support project.

Locusts and Grasshoppers. An entirely distinct SEA was drafted in July/August 1993, covering possible locust and grasshopper control interventions in Mozambique. It is a supplement to the 1989 PEA for Locust and Grasshopper Control in Africa and Asia (TAMS 1989). This locust/grasshopper SEA was prepared in the context of a central USAID project, the Africa Emergency Locust and Grasshopper Assistance (AELGA) Project (managed in Washington by AFR/AA/DRCO, the Disaster Response Coordination Office), in direct response to extensive grasshopper outbreaks in March/April 1993 in the rice growing areas of Cabo Delgado, Sofala, Nampula and Zambezia provinces. Over 15,000 ha of rice are said to have been destroyed in the Beira area alone (Belayneh 1993). Some 15 other country-specific locust/grasshopper SEAs have been prepared in Africa and Asia. During post-drought periods the risk of locust outbreaks is increased, and there is currently an upsurge in desert locusts, African migratory locusts and possibly others. Therefore, it was judged prudent to put the locust SEA in place, to apply to an emergency response that could be launched upon short notice. However, for that to occur, a specific Action/Operations plan for Mozambique will still be required, drawing upon the locust/grasshopper SEA.

Thus, this **SEA of Pest Management and Pesticide Use in the PVO Support Project** is complementary to the Mozambique locust/grasshopper SEA (Belayneh 1993). It applies USAID Environmental Procedures (22 CFR, Section 216) to the entire country and to a broad range of possible pesticide/pest/crop combinations and veterinary needs addressed by the PVO Support Project. It emphasizes pest and pesticide management according to integrated pest management (IPM) principles, which safeguard human health and the environment by minimizing pesticide use while maintaining crop productivity. IPM systems achieve effective, sustainable and economic pest management by relying as much as possible on ecological (non-chemical) means such as pest-tolerant crop cultivars, cropping practices that prevent pest buildup, and biological controls. Least-toxic, maximally selective pesticides are employed only as necessary and only if the pesticide use in question has been proven to be cost-effective.

The objective of this SEA is to provide the Mission, the various implementing agents (PVOs/NGOs, contractors, etc.) and concerned government counterparts with an efficient, effective and country-specific mechanism--including design and implementation guidelines, decision criteria, review procedures and monitoring and mitigation guidance--for ensuring that PVOs have the capacity to mitigate the potential negative impacts of pesticide use and that they are familiar with, and take maximum advantage of, alternative pest management methods. Since a follow-on project is possible, this SEA includes recommendations

applicable to both the short and the long term. The Mission will implement the PVO Support Project, to the best of its ability, in full accordance with SEA findings and recommendations.

On the strength of an approved and enforced SEA, authority for environmental approval of individual sub-grant activities under the PVO Support Project would normally be delegated to the Mission. Further environmental assessment would only be undertaken if proposed activities would result in significant negative environmental impacts not adequately anticipated by this SEA.

2.2 Focus of the SEA: the PVO Support Project (656-0217)

The PVO Support Project was approved on June 6, 1990 with the purpose of reducing vulnerability to absolute poverty, induced by the local insurgency, within targeted population groups in Mozambique. It has been extended and amended several times and is now funded at a level of U.S. $83.6 million, with a PACD of September 30, 1996.

U.S. PVOs and Mozambican NGOs receiving sub-grants under the PVO Support Project undertake small-scale projects which are evolving from a focus on short-term, acute emergency aid to rehabilitation activities that lay the foundation for future development. Most of the initiatives are related to water and sanitation, health and agriculture.

PVO Support Project staff advised the SEA team to base the present document on the activities of seven PVOs: Food for the Hungry International (FHI), World Vision Relief and Development, Inc. (WVRD), CARE, Save the Children Federation (SCF), Adventist Development and Relief Agency International (ADRA), World Relief International (WRI) and Africare. Those PVOs implement sub-grants which presently or potentially involve pest management and/or pesticides. Indeed, requests by PVO agronomists for USAID authorization of pesticide use in their programs triggered the EA process. Because no USAID funding is contemplated for mosquito spraying for malaria control, or for tsetse fly control, proposed pesticide use patterns (described in greater detail below) are confined to crop production and the control of veterinary diseases spread by other arthropod parasites of livestock.

2.3 SEA Team Timetable and Information Sources

The Team Leader and IPM Specialist were briefed August 3, 1993 in Washington, D.C. by A.I.D. staff and given background documents relevant to the assignment. Briefing by Mission staff was provided upon their arrival in Maputo, Mozambique August 5/6.

The IPM Specialist worked in Mozambique August 5-17, and the Team Leader/Pesticide Management, Evaluation and Training Specialist from August 6-26. They reviewed the available documentation and produced a draft SEA outline, a tentative workplan and a preliminary list of desired contacts by Monday, August 9. Fact finding and interviews in Maputo were complemented by field visits to FHI agricultural sites near Beira (Sofala Province) August 12-13 and to WVRD agricultural sites near Quelimane and Gurue

(Zambezia Province) August 22-24. These field visits allowed the team to interview PVO beneficiaries, cooperators and field staff and to see some of the circumstances under which requested pesticides would be used. Each team member debriefed Mission staff before departing from Mozambique, soliciting input and discussion about issues raised by the SEA.

The document was completed by the team in the U.S. The first draft was submitted to the USAID/W Africa Bureau Environmental Advisor on October 28. In November 1993 the Environmental Advisor traveled to Mozambique to review the Transition Program PEA and the two draft SEAs with the Mission, with a view towards harmonizing the documents and identifying appropriate follow-up actions. This SEA of pest management and pesticide use in the PVO Support Project was finalized and submitted to USAID/Mozambique in January 1994, in anticipation of follow-up PVO implementation and training events being based in part on the guidance provided herein.

3.0 COUNTRY SITUATION AND AFFECTED ENVIRONMENT

3.1 Biophysical Conditions Under Which Pesticides are to be Used

The Republic of Mozambique (Fig. 1) is situated on the southeast coast of Africa between the latitudes 11-27 degrees south and the longitudes 30-41 degrees east. It covers a total land area of 801,590 sq km, which includes some 13,000 sq km of inland waters such as the manmade Lake Cabora Bassa and other lakes including Niassa, Chilwa, Chiuta and Amaramba. Lying between the Indian Ocean and the central land mass of southern and central Africa, Mozambique borders Tanzania to the north, Malawi and Zambia to the northwest, Zimbabwe and South Africa to the west, Swaziland and South Africa to the south and the Mozambique Channel to the east. There is a steady rise in elevation from the eastern coastal plain to the mountains in the west, with main rivers flowing from west to east toward the Mozambique Channel. A synopsis and summary assessment of the environmental and natural resources of Mozambique can be obtained from the two introductory volumes produced by the NORAD Environment Working Group (1990).

3.1.1 Climate, Hydrology and Soils

Climate Mozambique can be divided into five major climatic zones based on rainfall (Fig. 2): the arid zone, characterized by low rainfall (< 500 mm per year); the dry semi-arid zone and the wet semi-arid zone, characterized by moderate rainfall (> 500 and < 1000 mm per year); the sub-humid zone, characterized by high rainfall (1000-1400 mm per year), mostly along the coastal strip and in the highlands; and the humid zone, characterized by extremely heavy rainfall (> 1400 mm per year), in the highlands of Upper Zambezia Province and the western parts of Manica Province. The annual variation in relative humidity is 60-80% and large areas, particularly along the coast, are more or less sub-humid.

There are two distinct rainy seasons: the hot season rains and the cool season rains, the latter occurring along the coast south of 19 degrees latitude, in Zambezia Province and at higher elevations of Espungabea in Manica Province. In general, rainfall follows a gradient from the ocean inland, with average rainfall ranging from 350 mm at Pafuri in Gaza to 2,348 mm at Taciane in the mountains of Upper Zambezia. Average annual precipitation in most areas ranges between 1000-1400 mm. The intensity of the rains increases towards the north, but the frequency of intense rains does not.

Average annual temperature is influenced by physical features and proximity to the sea. Highland regions and southern coastal areas have average annual temperatures below 23 degrees C (79 degrees F). Average annual temperatures at Chicoa in Tete Province and at Pemba in Cabo Delgado Province exceed 26 degrees C. In the rest of the country, average annual temperature varies between 23 and 26 degrees C, with mean monthly highs of 24-28 and mean monthly lows of 19-22.

Average wind speed varies from 2.5 to 9.4 kph, higher in the Ulongue-Lichinga stretch in Tete and Niassa provinces, and along the coast. Wind speed is relatively low in Zambezia and in drier parts of Maputo and Gaza Provinces.

Hydrology Mozambique has extensive aquatic habitats, including rivers, swamps, natural and artificial lakes, and marine areas. Lakes (mostly fresh water), lagoons and marshes, generally shallow and varying in size with the season, are most frequent on the plain south of the Save River. The extensive wetlands of the plain and the coastal strip are centers for bird nesting and an important habitat for invertebrates, and contribute significantly to the diversity of local fauna.

Inland water with useful fishery resources consists mainly of the Cabora Bassa reservoir, Lake Niassa, lagoons and estuaries totaling about 2200 sq km, small lakes and reservoirs amounting to 300 sq km, and about 15,000 km of rivers. The exploitation of these fisheries is of major importance to the population of the interior. Coastal mangrove swamps are directly linked to the conservation and development of fishery resources, notably prawns.

Income from commercial fishing is mainly from prawns, which are an important revenue earner. Today the fisheries sector represents about 40% of total export earnings, and the trend is for this share to increase. Similar progress may be observed in the case of marketed fish, which constitutes an increasing proportion of marketed protein foods.

A considerable proportion of the land is irrigated or has the potential for irrigation. Irrigation is necessary throughout the country for intensive agriculture, particularly in the south where there is a water deficit. Some 70,000 ha, out of three million cultivated with annual and perennial crops, were irrigated in 1980.

Mozambique is located mainly in the lower sections of river basins and is thus vulnerable to reduction in water flows and increases in pollution. There has been no evaluation of the impact of accumulating pollutants in the soil and in the rivers, nor of their effects on the fishery resources of reservoirs and river estuaries.

Soils. The soils of Mozambique are diverse and variable, highly influenced by climate and geology. The major soil types are:

- -- Alluvial and hydromorphic soils; these soils are immature, derived from unconsolidated river, lake and ocean sediments. They occur often in flood plains of the major rivers, such as the Umbeluzi, Maputo, Incomati, Limpopo and Zambezi.
- -- Verti-soils; these soils are derived from limestone and lava and are generally found along the northeast coast, in the Buzi flood plains west of Beira, and in Moamba and Sabie regions in the south.
- -- Sandy soils; characterized by Karroo sedimentary rocks, other sedimentary rocks, quartz-bearing crystalline rocks, and basalt, these are found largely in the southern, middle Zambezia, Nampula and Cabo Delgado regions.

-- Hydromorphic and salty sandy soils; found mainly in coastal plains and depressions and in the Limpopo River region.
-- Red clay soils; these are deep and well-drained soils mainly derived from quartz-bearing crystalline rocks, young sediments and sedimentary rocks. They are found in the northern part of the country.
-- Shallow (lithoidal soils); these are derived from consolidated materials. Occurring in the mountains and very dry plateau regions, they are found in the north and south of the country and are very favorable for cattle production.

Alluvial soils have the greatest agricultural potential, and cover considerable areas in the extensive Zambezi delta and along river banks. Coastal areas and the interior of Gaza and Inhambane Provinces generally have well-drained, sandy soils with relatively low productive potential for annual crops because of their low fertility, poor water retention and coarse texture. However, the coastal strip is well-suited to tree crops, notably cashew and coconut.

In southern Mozambique, climatic conditions are the primary determinant of agricultural production and soil fertility is secondary. In the low-lying plains where the largest irrigation schemes are situated, the soils are mostly fertile and require little fertilizer to maintain soil nutrient levels. In highland areas soils may show nutritional deficiencies (nitrogen and phosphorous). Fertility problems are particularly serious in the densely populated coastal strip.

In the north, climatic conditions are more favorable for agriculture. Fertility is without doubt the factor that could limit agricultural production, particularly of food crops. The soils are normally deficient in nitrogen, phosphorous, sulphur and occasionally potassium.

3.1.2 Agroecological Zones

Over 87% of Mozambique's population live in rural areas and derive their livelihood from agriculture. Rural population centers in agricultural zones and areas with high livestock numbers will presumably be most affected by nontarget impacts of pesticide use. The family farm sector produces the bulk of three cash crops--cotton, cashew and coconuts--and presently uses high levels of pesticides on cotton. Citrus, sugarcane, tea and tobacco are grown as industrial crops and also see considerable pesticide use (Pancas and Segeren 1993). People are concentrated along the coastal strip and in the river valleys, which have lighter soils and enough water and thus are the most suitable areas for farming.

There are three livestock production areas in Mozambique. Nearly 75% of cattle production is concentrated south of the Save River, in Maputo, Gaza and Inhambane Provinces. The central zone--Sofala, Manica, Tete and part of Zambezia Provinces--contains about 18% of the cattle. Only about 6% of cattle are kept in the tsetse fly-infested north, between the northern half of Zambezia Province to the Rovuma River. All livestock are maintained "under natural pasture."

Mozambique's agroecological zones (Fig. 3) are mainly determined by its unique location on the continent and the many major rivers (Save, Limpopo, Zambezi, Sabie, Umbeluzi, Incomate and Maputo) that traverse the country.

Region I consists of wet, hilly plateau and highland areas with highly specialized, diverse agriculture, including crops which are not viable in other parts of the country (e.g. tea, coffee, seed potato, temperate fruits and dairy cattle). Especially in Upper Zambezia, there is great production potential for dryland rice because of the length of the growing season. Soil erosion in the highlands can be serious.

Region II has a June/July-October/November dry season and a December/January-March/April wet season. It is suitable for the production of maize, peanuts, cassava, beans, cotton, fruit, oilseeds, tobacco, potato, kenaf, sorghum and pineapple. Like in Region I, tsetse flies limit livestock production.

Region III is typified by semi-intensive farming, but irregular rainfall coupled with high temperatures are a problem. The region is well suited to mixed arable and livestock farming and the cultivation of drought-hardy tropical fruits such as cashew and mango. Drought-resistant crops such as cotton, sorghum, peanuts and beans are intercropped in the coastal area.

Region IV is perhaps best suited for livestock production and forestry because rainfall is so irregular. The most appropriate crops are maize, cassava, beans, sorghum, millet, cotton and fodder legumes.

Region V is only viable for agriculture where there is irrigation.

3.1.3 Flora, Fauna and Ecologically Sensitive Areas

Mozambique's natural vegetation is as varied as the diverse soil types, geology, altitudes, latitudes and climatic factors would lead one to expect. Major vegetation types include forests, woodland, grasslands (often used as pasture) and mangrove swamps.

The two major forest types are partially-evergreen forest and deciduous forest. The former type is found in areas receiving >1200 mm annual rainfall--mostly in the plateau and middle plateau regions of central and northern Mozambique and in the transition zone to mountain forests. Deciduous forests occur in areas receiving 600-900 mm annual rainfall and are most common around the Lower and Middle Zambezi and their tributaries.

Four woodland types include: Miombo woodland, found in the Namupal, Montepuez and southern Niassa regions; Mopane woodland, which covers most of the land area (particularly the main river valleys); undifferentiated woodland, which is found north of the Limpopo River and is distinguished by the absence of Miombo and Mopane; and *Acacia* woodland, which is considered transition vegetation and which occurs mainly in the southern part of the country near the border with South Africa and Swaziland where the rainfall varies

between 600-1000 mm. Grass is characteristic of flood plains, swampy areas and wetlands, savannas, shallow drainages, marginal areas and plateau regions. There are major areas of unexploited potential pasture.

Protected and sensitive habitats (e.g. bodies of water with vulnerable aquatic life) within or closely bordering crop and livestock production areas may be at risk from pesticide use. The total area designated as protected is 92,250 sq km, almost 13% of the land. Protected areas include National Parks (four), Game Reserves (five), Hunting Areas (13) and Forest Reserves (14).

The fauna of Mozambique is unique and diverse, with a remarkable degree of endemicity, both at species and higher taxonomic levels. The great majority of native terrestrial species in all faunal groups appear to be dependent on forested or wooded areas. Natural protected areas, conservation zones and gazetted game reserves are shown in Figure 4. Animals protected in Mozambique and globally threatened and endangered wildlife species that occur in Mozambique are listed in Appendix F.1.

Figure 1. Map of Mozambique Showing the Ten Provinces and Their Capitals, and The Mozambique Channel (Source: Environmental Working Group 1990).

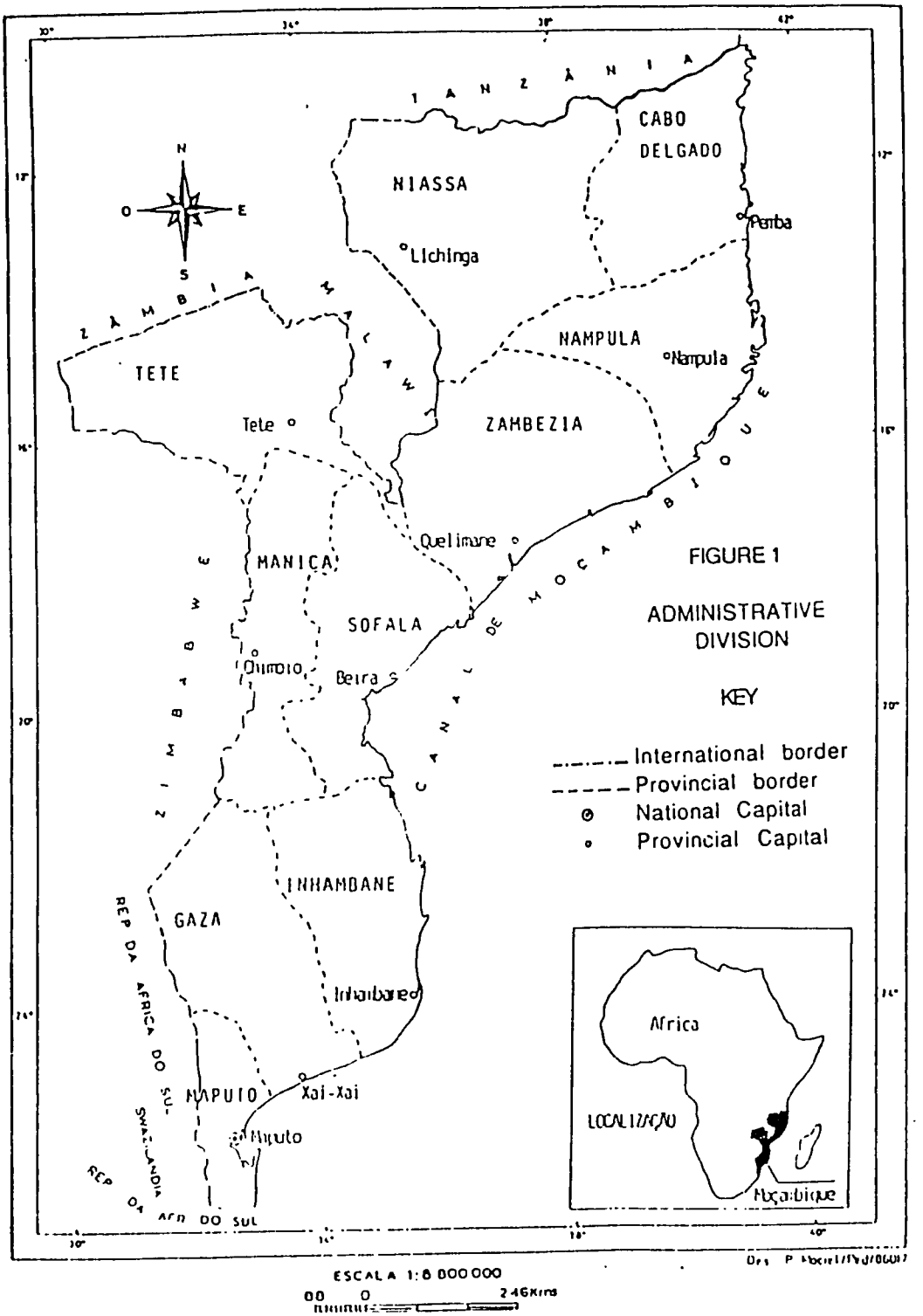


Figure 2. Main Climatic Zones (Based upon Annual Precipitation) of Mozambique (from. Environm. Working Group 1990).

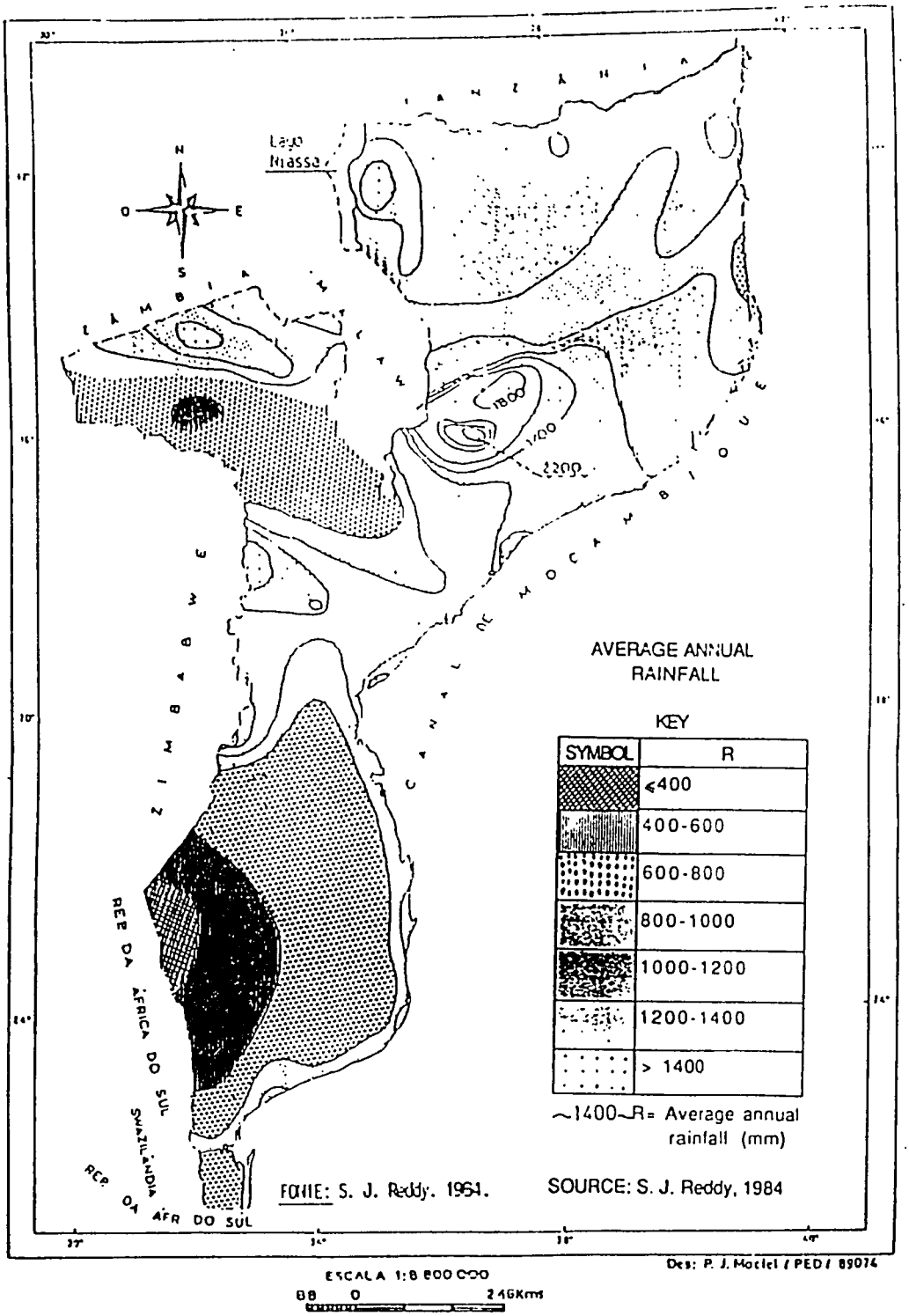


Figure 3. Agro-Ecological Regions of Mozambique (from. Environm. Working Group 1990).

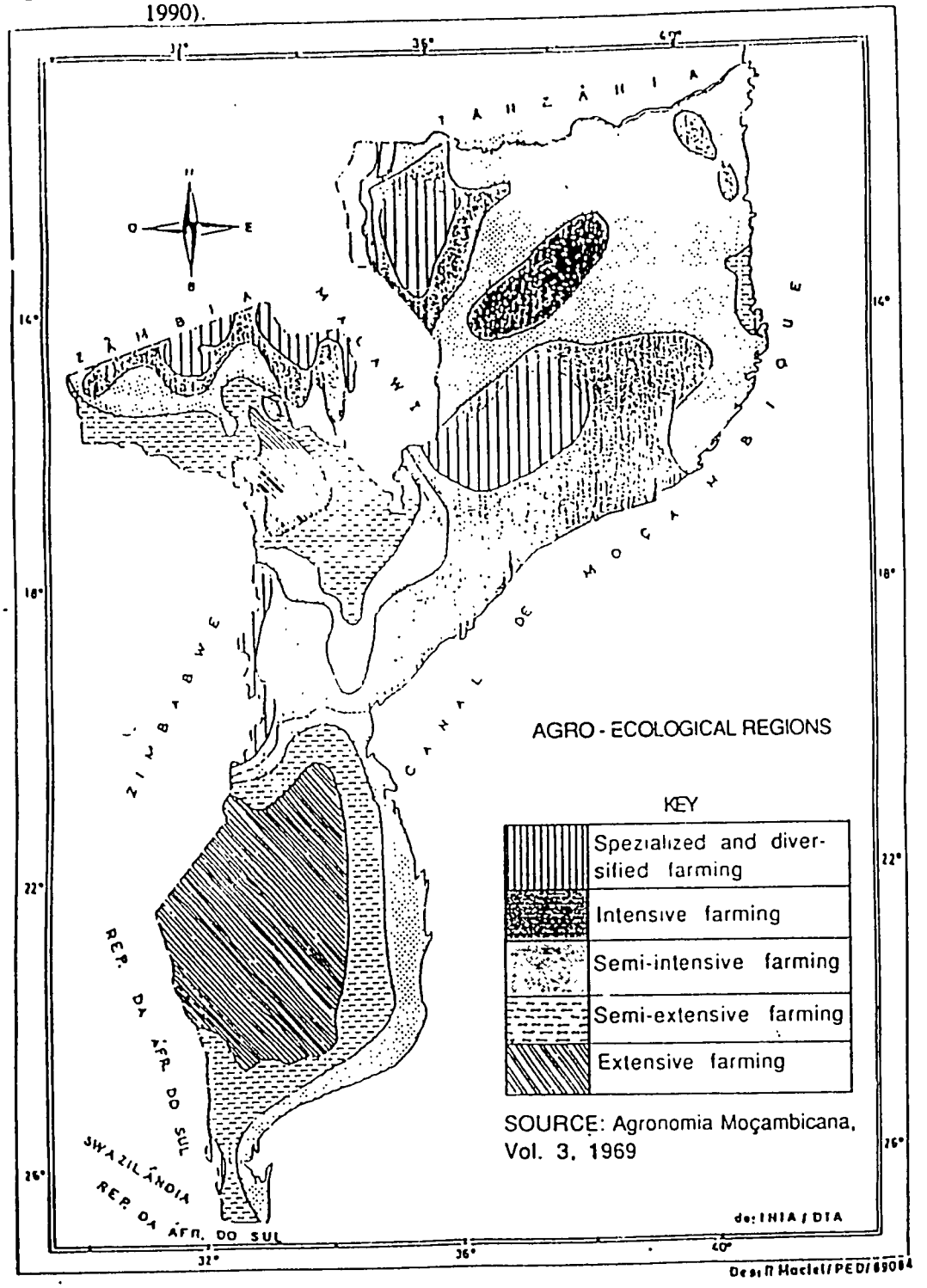
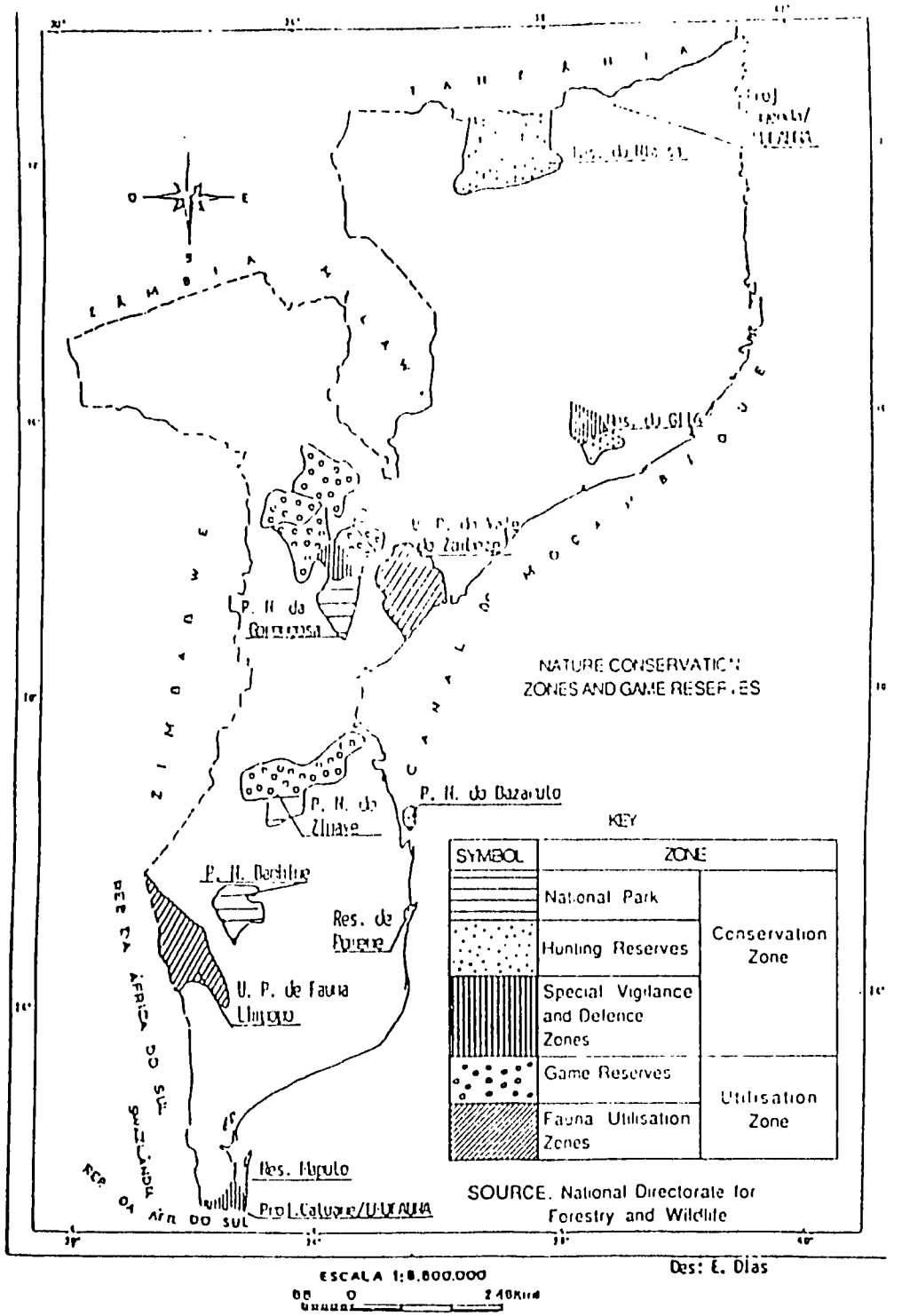


Figure 4. Nature Conservation Zones and Game Reserves in Mozambique (modified from Environm. Working Group 1990).



3.2 Current Pest Management Problems, Practices and Capabilities

For insight into pest problems and recommended cultivation practices (including some pest control measures) at the smallholder farm level in Mozambique, see the World Vision booklets "A Tua Horta" (Your Vegetable Garden) and "O Guiao do Campones" (The Peasant's Guidebook) (Anonymous 1993a, 1993b), Plant Protection Department manuals by R. van den Oever and P. Segeren (see Bibliography).

3.2.1 PVO Support Project Farmers

3.2.1.1 Overview of Farmers' Pest Management Problems

The worst pests that the "deslocados" face are insects in growing crops, and insects (mainly weevils) and rodents (mice and rats) in stored food grains. Pests that tend to be sporadic on a geographical or seasonal basis, but are said to be able to cause greater than 50 percent, or even complete, crop loss over a large area are: the maize stem borer, birds at harvest in sorghum and millet, the long-horned grasshopper in rice, aphids in many vegetable crops, and the cassava mealybug (Jonathan White, WVRD, pers. comm.).

Other pest problems encountered by smallholder farmers assisted by WVRD in its agricultural recovery programs in Zambezia, Nampula and Tete Provinces include: maize streak virus; beetles, aphids, thrips and virus on cowpea; field rats in rice; locusts, cutworms, caterpillars and thrips on many vegetables; green mites and virus on cassava; and weeds in maize, sorghum and millet--both the parasitic *Striga* that is becoming increasingly common, and annual and perennial weeds that are not removed soon enough to prevent crop yield loss.

Major pest problems faced by FHI "deslocados" in Sofala Province were recently listed by the FHI Senior Agronomist. Those pests are, for maize: termites, cutworms, wireworms, aphids, grasshoppers (including the elegant grasshopper), stemborers, downy mildew, weevils and mice and rats in storage; for sorghum: stem borers and weevils; for *Phaseolus* beans: thrips, aphids, bean fly, bacterial ringspot, anthracnose, and mice and rats; for cassava: mealybug, green mites, mice and rats, and weevils in storage; for potatoes: early and late blights; and for market gardens (cabbage, lettuce, onions, carrots, squash, tomatoes, etc.): various insects and fungi. Polyphagous (omnivorous) pests include grasshoppers, armyworms, cutworms, and mice and rats (Buck Deines, FHI, pers. comm.)

Other polyphagous pests mentioned in the field are various locusts (see Belayneh 1993), crickets, ants, termites and slugs. Crop-specific pests mentioned include: root weevils and termites in cassava; nematodes in okra and tomatoes; fruitworms, bollworms, bacterial wilt, and *Alternaria* leaf spot; rootworms, grasshoppers and aphids of cole crops (cabbage, Chinese cabbage, collards, etc.); the pumpkin fly and downy mildew on pumpkin and squash; and peanut rosette virus (Geddes 1990). Other problems are of a physiological nature but may be mistaken for diseases (such as blossom-end rot).

In addition to crop pests, some smallholder farmers assisted by the PVO Africare must control ectoparasites of their draft animals, namely ticks that can vector pathogens that cause anaplasmosis and babesiosis.

3.2.1.2 Overview of Farmers' Current Pest Management and Related Practices

To attempt to deal with the aforementioned wide array of crop pests, smallholder farmers are employing a considerable number of pest management tactics. Some of these tactics are listed by category as follows:

Pest prevention. The farmers employ a wide range of prevention methods including: selecting the best possible seed for next season's planting by taking seeds from vigorous, disease-free, insect-free plants from the middle of fields; giving squash seeds a germination test (floating) and then pre-germinating the seed by soaking 12 hours; planting sweet potatoes in higher, drier areas of the field to prevent root weevil infestation; keeping water and soil away from tomato leaves, and washing hands and avoiding smoking during transplanting to prevent tomato virus diseases; routine removal of virus-infected cassava plants; sterilizing the knife when cutting cassava pieces for planting; adding straw under squash vines to prevent stem and fruit rot; killing exposed roots and rhizomes of perennial grass and sedge weeds by sunlight before composting; hand pulling and burning of the parasitic weed *Striga*; and controlling other weeds (annuals) before seed set.

Pest-resistant crop varieties. A small number of "deslocados" are already planting improved varieties of maize ("Matuba" and "Umbeluzi" in low and medium altitudes, and "Obregon" in higher altitudes), sorghum ("Chokwe", "WSV387" and approved local varieties), millet (approved local varieties), cassava ("Macudo", "Mulaleia" and "Fernando Po"), cowpea ("IT-18" and "Namuesse"), peanut ("Bebiano Branco" for dry and medium-rainfall zones, and "Natal Common" and "RMP-12" for wet zones). Other new and local varieties are being tested in cooperative programs among the National Agricultural Research Institute (INIA), WVRD, FHI and the government parastatal company SEMOC nationally, as well as with a number of International Agricultural Research Centers (IARCs), especially ICRISAT, CIMMYT, IITA, CIP and CIAT. Pest-resistant varieties will probably be identified soon for sweet potato, tomato, green beans, squash, collards, etc.

Pest scaring techniques. Grasshoppers in collards and some other small-scale vegetable crops are scared away by children or the farmers themselves by shaking branches over the crop. Birds are frightened from sorghum and millet by banging pans, etc.

Manual controls. In backyard and market gardens hand picking of larger insect larvae is practiced, for example various caterpillars from tomatoes as well as collard greens and other cole crops. Slugs are also removed by hand. Larger insect eggs are sometimes destroyed by smashing with fingers. In grain crops where the parasitic weed *Striga* is becoming a problem, farmers are encouraged to hand pull and burn the *Striga* plants before seed formation. Entire cassava plants are removed by hand to prevent virus spread in the field,

whereas some vegetable crop parts are hand plucked and destroyed to prevent disease and insect buildup.

Physical controls. Wood ashes are added to the soil as a barrier against termites and caterpillars, and possibly for control of certain diseases. Wood ashes also are commonly placed in the whorls of maize for stem borer control. Sometimes ashes or lime are used as physical barriers on the perimeters of transplant beds and small vegetable plots.

Cultural controls. A number of practices are aimed at lessening the negative impact of pests. Some of these are: rotating crops when feasible, e.g. not planting tomatoes for several seasons in beds that have become nematode infested, or not planting crops of the same plant family for two or three seasons (sometimes crop rotation is not practical because farms are so small); crop plant densities high enough to achieve acceptable crop populations while losing some of the crop to pests; and intercropping in many different combinations to spread risk of crop loss because of pests. Planting dates can be varied to avoid some insects and diseases. Correct planting and transplanting depths can help prevent root and stem rots, etc.

Biological control. The primary effort in Mozambique has been by INIA, the Departamento de Sanidade Vegetal (DSV, the Plant Protection Dept.) and cooperators (including WVRD, etc.) to control the cassava mealybug by releasing a parasitic wasp. Some smallholder farmers assisted by PVOs have benefited from the release of approximately 500,000 wasps in major cassava growing areas (Lars Kjaer, DANIDA, pers. comm.).

Chemical controls. Very few smallholder farmers are themselves using chemical pesticides to control pests. One farmer spoke of some "medicamentos" (the farmer didn't know what they were) being furnished and applied by one of the FHI extensionists. These seemed not to be the botanical insecticides that FHI is beginning to extend. In another instance, farmers reported that DDT (presumably old stock from the malaria control program) is occasionally bought in Beira by a village resident and sold locally. Apparently farmers sprinkle the DDT dust with their bare hands. Such cases are probably rare. A male staff member of the "Casa Agraria" near Dondo Town applies Basudin (diazinon) for some smallholders. Africare has purchased 'Bayticol' (flumethrin, an acaricide) for farmers, who applied it themselves to control cattle ticks.

Plant-derived insecticides. Certain plants with insecticidal properties are being used by some smallholder farmers. Infusions of smoking tobacco, garlic or hot chili peppers ("piri-piri"), made by boiling the mixtures, each with grated bar soap as a sticker, are effective for controlling a number of insects, especially aphids. Various combinations of these are made. Garlic, wood ashes and motor oil, plus grated soap, is also used at times as an infusion. These mixtures are usually "painted" on with a hand broom or sprig of leaves. Plants such as sunflower and castor bean are planted as insect repellents. Native plants such as *Sesamum alatum*, intentionally not weeded out by the "deslocados", are probably utilized to a considerable extent (Segeren 1993).

Improved crop storage methods. To prevent rodents and insects from destroying stored small grains such as maize, sorghum, millet and various legumes, farm families most commonly hang them in the kitchen to dry over the fire. The cereals are then smoked every three weeks or so to keep them pest free. Maize and sorghum seed are then mixed with wood ashes and put in plastic containers or clay pots which are sealed well. For legumes, a small amount of cooking oil, sand or ashes are mixed in before putting the seed into containers and sealing. Most smallholder farmers do not yet have more elaborate, outside storage bins. The small number that do sometimes dry the grain by building a tiny fire from time to time under the raised bin.

3.2.1.3 Farmers' Pest Management Capabilities

Even with the array of simple, low-cost pest management methods listed above, smallholder farmers are not adequately managing their pests. With family labor for hand picking, scaring, applying botanical insecticides, etc. the farmers can keep up with certain pests part of the time in small plots, for example in backyard gardens. But damping-off diseases, nematodes, rootworms and other pests of seeds and seedlings take a heavy toll from the small producer. On a larger scale, such as an entire field of maize or cassava, pest control is often not satisfactory. Worse, periodic or localized upsurges of pests such as grasshoppers can devastate a whole rice crop, or mealybugs can ruin an entire planting of cassava. Over an even wider area, birds can cause heavy losses to hectares of sorghum and millet at maturity.

There were a mix of pest managers on the small farms visited. Generally it was the wife who did most of the cropping and thus most of the pest managing (about 70% of the farmers served by FHI are women). On other smallholdings it was the husband who took primary responsibility for these tasks. Many times the whole family participated in fending off pests. In general, whoever worked in the gardens or fields most made the pest management decisions.

Pest control action was usually curative rather than preventive, i.e. nothing was done until pests were already obvious and causing damage. Smallholder farmers did take advantage of the PVO extensionists and consulted them often on when and what steps to follow to control their pests, and they welcomed any assistance in preparing natural pesticides. PVO extensionists and agronomists were often the only professional assistance available.

The majority of smallholder farmers visited are illiterate. Surprisingly, a few spoke English reasonably well (probably from having been in Zimbabwe or other neighboring countries). Most farmers have had little exposure to synthetic pesticides. But for those having seen or heard of them, "medicamentos" (medicines) or "drogas" (drugs) are often something mystical or magic, i.e., a "cure all". The belief is that pesticides kill pests and not people, which unless dispelled by effective education, leads to many careless and irresponsible practices, such as sprinkling DDT dust by hand onto vegetables. On the other hand, one farmer interviewed knew that he couldn't eat his sprayed garden vegetables until several days

after spraying. The PVO extensionist had applied the chemical pesticide, but the farmer had no idea what it was. With some instruction from PVO staff, some farmers had learned the importance of careful handling of home-made nicotine and soap solution for aphid control on collards. They understood that any solution left over should be buried, and that the collards shouldn't be eaten for two weeks after the last application.

At this point the costs of controlling pests in the smallholder sector are still relatively low because of limited options and the availability of family labor. That situation could change as the "deslocados" become more settled and off-farm work in small towns becomes accessible, thus increasing the opportunity costs of pest management. Also, the need for improved pest control in market vegetables will increase with this permanency. Many small plots of onions, lettuce, cabbage, Chinese cabbage, collards, sweet potatoes, etc. are even now destined for local markets.

3.2.2 PVO Support Project Agronomists, Extensionists and Field Technicians

The pest management problems of PVO Support Project agronomists, extensionists, and field technicians are essentially the same as those of farmers. However, larger areas than the farmers' are devoted to research and demonstration plots, seedbeds or "viveiros", and seed/rootstock multiplication fields. These monocultures tend to aggravate pest problems. For example, there are serious problems with *Alternaria* on tomatoes at one large research station, whereas the same tomato varieties in farmer-cooperator plots, grown on a smaller scale, were not so severely attacked. Virus-affected cassava seemed to be more widespread in one multiplication field than in some farmers' plots.

PVO field staff face a double-edged sword of seasonal or localized, as well as endemic pests. For example, grasshoppers, crickets, rats and termites can be especially problematic after a drought, whereas other pests are nearly always present: maize stem borers, beetles in stored grain, and cassava virus. Keeping grasshoppers and other foliage eaters from devouring seedbed plants is another challenge for PVO field staff, especially because nurseries are such a high priority in their research and extension programs. Red spider mite on tomatoes is just one example of a pest that can become a major problem very quickly in PVO research plots.

At present, ectoparasites of livestock (mainly cattle ticks) are of concern only to Africare (ticks vector the pathogens that cause anaplasmosis and babesiosis). Other PVOs do not have animal programs. Nor do they use or plan to use pesticides for malaria mosquito control (Robin Mason, pers. comm.).

3.2.2.1 PVOs' Pest Management Approaches

Some of the PVOs already have an integrated pest management (IPM) component in their agricultural recovery programs. WVRD's IPM approach includes[1]:

-- Utilize natural methods of pest control whenever practical (e.g. nicotine (from "rope" tobacco) and soap for aphids);

-- Develop and promote biological control methods whenever possible, for example collaborate with INIA, etc. to release natural predators and parasites of mealybug on cassava;

-- Select crop varieties with tolerance to insects, diseases and other pests;

-- Select healthy planting material for perennial crops;

-- Promote mixed cropping for the major cereal and legume crops. Planting density should allow for some plant loss;

-- For vegetables, plant a wide range of crops and sow sequentially;

-- Promote awareness and manual control of the parasitic weed *Striga*; and

-- Improve crop storage techniques.

These IPM tactics are extended to smallholders by selected farmer leaders, through demonstration plots and by inviting key local farmers to attend the harvest of research plots.

In a similar vein, "FHI promotes the strategy of IPM and employs insecticides (and other pesticides) only when needed to prevent unacceptable economic injury to the crop... In other words, FHI strives to control pests with a minimum of chemicals." (Buck Deines, Senior Agronomist, in memo to Robin Mason, USAID). FHI agronomists are currently conducting research to determine which food crops and varieties are suitable for small farmers, and which of those varieties can survive pest attacks without insecticides and fungicides. For example, tomatoes are being studied to find varieties resistant to various fungi and nematodes. They are also attempting to separate those crops and varieties that can produce satisfactorily with botanical insecticides from those which need synthetic insecticides. Other investigation includes: cloth cages over seedbeds to exclude grasshoppers, grass fences around seedbeds to discourage other insects, testing of simple-to-make botanical insecticides, intercropping and crop rotation.

For the present, use of synthetic pesticides by PVO researchers, extensionists, and field technicians is minimal. According to interviews with PVO directors and field staff,

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[1] Jon White, Director of Agricultural Recovery Program, in memo to Robin Mason, USAID Advisor to PVO Support Project; also see WVRD pest management brochures for farmers (Anonymous 1993a, 1993b).

SCF, ADRA, CARE, and WRI staff are not now using any pesticides, and to their knowledge smallholder farmers in their programs are not either. Africare has used only the acaricide Bayticol (flumethrin), for control of cattle ticks.

WVRD has utilized some pesticides for seed multiplication purposes (Thiodan--endosulfan granules). A few pesticides have also been used to protect fruit tree nursery stock from mites, ants and aphids, according to their plant breeder (Lesley Sitch, pers. comm.). [Endosulfan is a Restricted Use Pesticide (RUP) in the U.S. and considered a Class I or Category I pesticide (HIGHLY TOXIC) by the U.S. EPA and the PRS/DSV/DANIDA, and so should not be used by PVOs until the person responsible for its use has been adequately trained (see 5.1.3).]

For project crops FHI has used Dipterex (trichlorfon) 2 1/2% granules and Thiodan 1% granules, applied by hand (with gloves), for maize stem borers; malathion 35% EC for corn aphids; Mitac (amitraz) for red spider mites; and Lebaycid for pumpkin flies. [Trichlorfon, designated Class II, and malathion, designated Class III by both the U.S. EPA and the PRS/DSV/DANIDA, are general use pesticides (GUPs) and therefore acceptable for PVO staff to use for project activities such as research, demonstration, extension, seed multiplication, etc. Amitraz and Leybacid are not registered for use in Mozambique at this time, so are not permissible for use in USAID-supported PVO projects.]

Some of FHI's pesticides have been purchased in Zimbabwe, which is only about 200 km from their research station at Lamego, Sofala Province. It should be noted here that PVOs are required by A.I.D. to "play by the rules" and purchase all pesticides within Mozambique, and only those pesticides that have already been registered in Mozambique and imported legally into the country (see 5.1). Purchases should be made from reputable distributors/dealers, such as those listed with each registered pesticide discussed in the "Guia de Pesticidas Registados em Mocambique - 1993" (Annex C.3), published by the PRS/DSV/DANIDA. These measures should help the DSV attain some reasonable control of pesticide importation and quality.

Products with the same active ingredient, but made by different companies, will likely be somewhat different with respect to formulation, solvents, combination of active ingredient(s), and concentration of active ingredient(s)--criteria used by the PRS/DSV/DANIDA in registration. Pesticide quality also varies considerably among manufacturers.

Synthetic pesticides are not presently being extended by PVOs to smallholder farmers, and there are no plans to do so in the near future. Botanical pesticides are used to a limited extent by PVO field staff in their research and training in the preparation and application of botanical pesticides is extended to the "deslocados", especially by WVRD.

3.2.2.2 PVOs' Pest Management Capabilities

In-house pest management expertise varies considerably among the five PVOs involved in agricultural recovery programs: WVRD, FHI, ADRA, SCF and WRI (CARE and Africare have no agricultural programs at present, except for Africare's animal traction program).

WVRD has a large agricultural staff including 13 expatriate agronomists and plant geneticists, and about 60 technicians. Many have had pest and pesticide management training during their formal education, especially those with Ph.D. or M.S. degrees. One of their female extension agents (a "tecnica media" or mid-level technician) has had six years of agricultural schooling since age 15. To extend their research results, WVRD has relied more on trained farmer leaders than on in-house extensionists or government extensionists seconded to their programs.

FHI's agricultural program has a Senior Agronomist with an M.A. degree in production and agricultural extension, a Research Agronomist from Zimbabwe, 11 agronomists with at least two to three years of university training and 38 extensionists. The extensionists are of two types: those with at least one to three years of agricultural college classes, or "deslocados" who are literate and FHI-trained. At least the two head agronomists have considerable experience in pest and pesticide management. In a recent memo on the possibility of FHI staff being involved in pesticide application for grasshopper control, it was stated that the person spraying "would be outfitted with waterproof boots, full body coveralls, face mask with filter, waterproof chemically resistant gloves, and a hat with brim capable of protecting the back of the neck." (Buck Deines in memo to Darell McIntyre, ARDO, USAID/Maputo). This substantiates the level of expertise and concern that FHI agronomists possess in the area of safe pesticide use.

ADRA has one Senior Agronomist from Honduras with 19 years of field experience and an M.S. degree, four supervisors, plus 35 extension staff (seconded from the GRM).

WRI has a Brazilian Research Agronomist with an M.S. in irrigation, plus three seconded extension agents. It is assumed that the agronomist is capable as regards pests and their control.

SCF has a small group of seconded extensionists that, as yet, have not requested any pesticides from the director. SCF's mid-level Mozambican technicians (extensionists) are junior high school graduates with six to 15 months of agricultural training. Information about their pest/pesticide management capabilities was not available.

4.0 PESTICIDE MANAGEMENT STATUS AND ISSUES IN MOZAMBIQUE

4.1 Prospective Pest and Pesticide Management Activities

4.1.1 Prospective Pest and Pesticide Management Activities and the Potential for Human and Environmental Health Risks

The productivity of the land and its farmers is likely to increase in Mozambique. One factor is that a significant portion of the USAID/Mozambique portfolio, such as the Private Sector Support Project (PSSP) (Loken 1993) provides incentives for enhancing the private agricultural sector's production and income. At its most fundamental level, increased agricultural production can only be achieved through two basic mechanisms--by increasing the amount of land under cultivation (both per farmer and in general), or by increasing the productivity of land already under cultivation (i.e., by agricultural extensification or intensification, respectively). Both the PSSP and PVO Support Project are likely to have an influence on the productivity of the lands under cultivation.

As noted by Loken (1993), the latter agricultural intensification alternative is normally the more environmentally desirable of the two strategies because it seeks increased productivity through more efficient use of existing resources (vs. development and potential degradation of additional resources). Therefore, to the extent that the PSSP and the PVO Support Project are successful in promoting this alternative production strategy, it should result in significant positive environmental consequences.

However, experience elsewhere shows that certain environmental and human health risks can accompany such a trend. It is evident that many farmers in Mozambique, particularly small-scale farmers, are not familiar with sound agricultural intensification practices, having relied to a great extent on traditional, shifting, extensive cultivation strategies in the past. This lack of knowledge, aggravated by the inadequate agricultural support services currently available in-country, could readily lead to significant resource degradation and, possibly, human harm if not properly monitored and addressed. Examples of such potential impacts would include decreased soil fertility from inappropriate use of chemical fertilizers; increased soil compaction or erosion, and the adoption of unsustainable cropping practices associated with the inappropriate application of increased mechanization; and environmental and human contamination from the improper management and use of agrochemicals. Therefore this aspect of USAID/Mozambique assistance probably poses the most important potential long-term environmental risks.

When crops are well managed, greater pesticide use is not necessarily an inevitable correlate of increased agricultural productivity. Nevertheless, a dramatic rise in pesticide use often accompanies agricultural development and a brief analysis is presented here of the prospects for increased pesticide use in Mozambique, particularly in connection with the PVO Support Project. It suggests opportunities for introduction of improved pest management alternatives to deal with pest problems.

4.1.2 Farmers' Anticipated Practice Changes Which Relate to Pesticide Use

Assuming that the peace holds in Mozambique, and that more and more displaced farm families return to their homes, it is very probable that pesticide use by smallholders will begin to increase. DDT use on smallholdings has already been mentioned in this report, and recently the FHI Research Agronomist found one farmer spraying tomatoes with the banned insecticide dieldrin (Ollie Lynn, pers. comm.). With improved technology reaching them, some growers will quickly see the incentive in market vegetables (particularly with irrigation during the dry season), hybrid maize (along the border with Zimbabwe), and the need to protect those and other crops from pests before and after harvest.

Another indication that pesticide use by "deslocados" will begin to escalate is the large list of pesticides recently submitted by FHI to the SEA team for review. FHI would like to know which of these would be allowed for internal use in research, demonstration, etc. All of these pesticides are currently recommended by the Sofala Province Department of Agriculture and/or other agronomists working in the province and therefore are likely to be accessible to smallholder farmers. [Many of those pesticides are not yet registered in Mozambique, or are in Special Review by the U.S. EPA, hence USAID can not support their use by PVOs.]

4.1.3 Prospective Activities of Agronomists, Extensionists and Field Technicians

WVRD will expand its present agricultural research and extension activities in Zambezia, Tete and Nampula Provinces on the following crops: maize, sorghum, millet, rice, cassava, sweet potato, potato, squash, legumes (cowpea, green beans, peanuts, etc.), garlic, onions, cole crops (collards, Chinese cabbage, cabbage, etc.), peppers, chilis, tomatoes, eggplant, lettuce, carrots, and possibly others. WVRD may expand its agricultural programs in the future to include Niassa and Cabo Delgado Provinces.

This PVO will continue to develop and extend its existing IPM techniques, as discussed in 3.2.2.1 above. In addition to protecting its investment in existing, extensive crop research projects, WVRD plans to become involved in intensive, irrigated dry season vegetable production. Undoubtedly, increased use of pesticides will occur should the above activities progress, and as WVRD cooperates with many other organizations.

FHI plans to expand its activities in Sofala Province, possibly to include three more research and seed multiplication stations (likely two will be in Dondo and Gorongosa), for a total of four. It will have to protect crops on those stations as well as on demonstration plots and seed/rootstock multiplication fields. FHI has requested the SEA team to determine the acceptability of numerous synthetic pesticides for control of pests of maize, sorghum, legumes, cassava, potatoes, tomatoes, cabbage (and other cole crops), lettuce, onions, garlic, carrots and squash, as well as for management of polyphagous crop pests.

FHI is interested in continuing its IPM research, particularly researching and extending natural pesticides such as neem. (USAID regulations prohibit the use of natural pesticides not registered by the U.S. EPA, except for limited, on-station experiments; see 5.2.1). Botanicals will be tried first in on-station trials. If practical, and after sufficient testing, they will be used for project operations and extended to the "deslocados". Testing of other IPM tactics such as physical barriers and anti-feedants will continue as well.

ADRA currently has agricultural development programs in northern Inhambane Province in Vilankulo, Inhassoro, Govuro and Mabote Districts. Important crops are maize, sorghum, millet, cassava, legumes, collards, onions and lettuce. ADRA's Agronomist, Armengol Garrido, notes that farmers generally have no effective pest controls, with the exception of small vegetable plots. Larger fields of maize are severely attacked by *Heliothis* and *Spodoptera*. ADRA would like to utilize non-chemical pest control methods, but has not yet obtained relevant information. They are also looking for recent information on commercial pesticides. ADRA plans to use the biological insecticide *Bacillus thuringiensis* (B.t.), Thiodan (endosulfan) and Dipterex (trichlorfon) in its programs this year.

Unfortunately for ADRA, and for all the PVOs, the very useful and safe B.t. is not yet registered in Mozambique and is not likely to be in the near future (Lars Kjaer, DANIDA, pers. comm.). Apparently no company is presently interested in seeking registration for it. Perhaps the PVOs as a group, through the PVO Support Project and with the assistance of PRS/DSV/DANIDA, could seek a company willing to initiate registration. B.t. is registered in the U.S. for virtually every crop in PVO projects (Tables 1-4, Section 5.1.1).

In contrast, endosulfan is a RUP in the U.S., in EPA toxicity Category I. In Mozambique it is considered HIGHLY TOXIC and in Class I, and by law is not to be used by smallholder farmers. PVOs must confine the use of endosulfan only to project activities conducted by highly trained project staff (see 5.1.3). Trichlorfon is considered a Category II pesticide by the U.S. EPA and by the PRS. It could be used by PVOs for research, demonstration, seed multiplication, etc. by properly trained and equipped (with safety gear) staff.

The ADRA agronomist plans to work with government-seconded extensionists to develop provisional pest damage thresholds (based on experience and information developed elsewhere). These could be used to determine when it is economic to spray their research and demonstration plots. ADRA wants to work with about 30 selected farmer leaders to increase soil fertility by providing free fertilizer for their carefully monitored plots. The farmers will then pay back the fertilizer with seed from harvest. Great caution has to be exercised in NOT going the next step and providing free pesticides (see 4.4.2).

SCF's agricultural recovery programs are centered in Gaza Province, principally near Xai Xai, Bilene, Massingir, Chicualacuala and Mandlakazi and there are plans to expand considerably over the next two years, possibly into the Moatize District of Tete Province. Although pesticides are not utilized at present, they probably will be. Some smallholder

farmers in the Chokwe irrigation scheme (near SCF projects) already are using pesticides and fertilizers. SCF hopes to avoid the problem of periodic droughts by moving into irrigated crops. If that means intensive vegetable production, then pesticides could well be used by field staff for research, demonstration, etc. While the SEA team was in Mozambique an FAO agricultural economist consultant was assessing SCF's present programs. The consultant may recommend limited use of pesticides by SCF. This possibility should be followed up by the PVO Support Project because at this writing SCF does not have an agronomist on their staff, only a few extensionists seconded from the GRM.

WRI assists the family sector in several capacities including agricultural recovery. Their programs presently are in Gaza Province in Chokwe, Mabalane and Chicualacuala Districts. Apparently WRI is downscaling their programs, including agricultural rehabilitation, and does not have plans at this time to include fertilizers and pesticides in their activities. However, were WRI to expand agricultural extension activities, "we most certainly would consider the use of pesticides, as the proliferation of pests along the Limpopo Corridor presents a major problem to those attempting to grow any crops." (June 1993 memo from David de Leyser of WRI to Robin Mason, USAID).

Africare could receive additional funding from the PVO Support Project in 1994 which would allow expansion of their programs to include agriculture, i.e. cropping. In case, there could be requests for pesticides for agricultural use. At present, pesticide use is limited to occasional tick control in their animal traction programs. [This presents a problem, because none of the acaricides currently registered in Mozambique are permitted for USAID project use (see 5.1.1). As in the case of B.t. (see above), Africare and USAID should seek to have a safe and acceptable compound registered as soon as possible.]

CARE has no agricultural development programs within the PVO Support Project at present, but there might be one in the Machaza District of Manica Province if USAID funding becomes available. If that happens, there might be need at some point for pesticides for "in-house" use. Important crops in that region are maize, millet, sorghum, cowpea, pigeon pea and several other legumes (Rosemarie Moreken, pers. comm.).

Even though the PVOs funded by the PVO Support Project now number only seven, there most likely will be more PVOs in the Project soon. In that case there will probably be additional agricultural recovery programs that could increase the demand for pest management, and therefore the demand for natural and synthetic pesticides.

4.1.4 Inadvisability of Proposed Emergency Pest Control Intervention Teams

WVRD proposes to become involved with a mobile, rapid-intervention pest control team that would operate at the provincial level, with spraying to be done with knapsack or ULV units. The mobile team would have a strong training component (to be provided by WVRD expatriate agronomists) for technicians at the provincial level. Then local technicians or contact persons (at the district level) would be trained for the longer term.

This SEA recommends against USAID/Mozambique and USAID-supported PVOs becoming involved with any such rapid-intervention team, or local pesticide application brigades. In theory the farmer-participatory and local empowerment aspects are attractive, but donors are learning that this sort of scheme, as developed thus far elsewhere in Africa (notably in several Sahelian countries), leads to over-dependence on pesticides and external inputs, and can be counterproductive (Kremer and Sidibe 1991).

Government and donor-supported locally-based pest control intervention teams are a form of subsidy (which contravenes USAID policy) and are not sustainable. In practice, team activities are exclusively focused on pesticides, and the cost-effectiveness of operations is dubious (Castleton et al. 1991, Kremer 1992, Jago et al. 1993).

Pest outbreaks of the magnitude these teams are supposed to address (confining themselves to emergency operations only) are sporadic. After much mobilization, publicity, training and preparation, trained personnel and resources in individual localities are to remain unemployed between infrequent emergencies. In practice, there are typically no guidelines observed that define emergency situations justifying intervention. Applications are frequent and made without appropriate economic or environmental monitoring, pesticides find their way to untrained people and inappropriate pests and crops, and free applications foster dependency on pesticides while diverting interest from more sustainable alternative pest management measures (Kremer and Sidibe 1991, Kremer 1992, Jago et al. 1993).

Quality control of spray brigade operations in Mozambique would be all the harder because five of the nine pesticides approved by USAID for locust/grasshopper emergency interventions are RUPs applicable only by highly-trained personnel (Belayneh 1993). In view of their broader development agenda and of the relatively low priority of pest problems among agricultural constraints, it would seem unwise for any PVO to take responsibility for ensuring that such a program functioned properly. Even if they did assume the burden, it would ultimately have to be handed over to government. Experience elsewhere is that pesticide intervention teams, even with donor support and oversight, are an unsafe, uneconomic and counterproductive initiative (Kremer 1992).

Instead, PVOs should continue their focus on sustainable, mostly preventive pest management activities. When a crisis is brewing, they should assist on an *ad hoc* basis with their trained personnel and logistical support, **while expeditiously transmitting an appeal for help to the national Plant Protection Department (DSV), which could direct a request to regional organizations created to deal with such emergencies.** Mozambique is a member of at least two regional migratory pest control organizations with the mandate to act in emergency situations requiring intervention not readily taken by individual farmers: the International Red Locust Control Organization-Central and Southern Africa (IRLCO-CSA) and the Desert Locust Control Organization/East Africa (DLCO/EA). They act not just against locusts, but also against other pests that occur in large, unmanageable outbreaks, such as army worms and the grasshoppers that recently swarmed in northern Mozambique. Both organizations cooperate with the Migratory Pest Unit of the Plant Protection Department (DSV).

IRLCO-CSA and DLCO-EA get inadequate support from their impove- ished member nations (though IRLCO is better supported than most) and are appreciated mainly during locust plagues. Employment and support for them from donors and PVOs, enhancing their public standing and capabilities while providing farmers with recourse during wide-scale pest upsurges, is a valuable development contribution.

These recommendations are in general agreement with those of the SEA of Locust and grasshopper control in Mozambique (Belayneh 1993), which states that "PVOs would need to work closely with the DSV and regional locust control organizations should there be occasion to be involved in control of migrant or outbreak pests." However, greater opposition to USAID support of village pest control brigades is expressed herein based on information about the performance of similar initiatives in the Sahelian countries (see references cited above).

4.2 Possibility of Build-up of Pesticide Resistance in Malaria Mosquitoes

Pesticide resistance can develop quickly when pests are constantly exposed to the same class of compound. World-wide, 17 species of malaria mosquitoes are considered to have developed pesticide resistance in agricultural areas where crop protection use of anti-malaria insecticides, particularly of synthetic pyrethroids, is heavy (Roberts and Andre 1994). This results in elevated disease incidence, with attendant loss of life and productivity. Perhaps worse, it diminishes the chances for safe and effective malaria control in future. Alternative insecticides must be deployed, and few insecticides are both effective and safe for use in dwellings and other sites where anti-malaria applications are customarily made.

There is heightened potential in Mozambique for the buildup of pesticide resistance in mosquitoes that transmit malaria pathogens, because the same pyrethroid insecticides depended upon for malaria control are also used in agriculture, especially in cotton production. According to Dr. Almeida Franco, head of field operations of the Malaria Control Section of the MOH, the synthetic pyrethroids lambda-cyhalothrin (commercial name Icon) and deltamethrin (K. Otrina) have been the primary insecticides for malaria control since 1992 (DDT was used before). Cyfluthrin (Baythroid), another pryrethroid, is being held in reserve. Other formulations of lambda-cyhalothrin, trade name Karate, are now being used for cotton spraying and other agricultural purposes. Taken together, synthetic pyrethroids have been heavily used in recent years, especially over extensive areas of cotton and often applied by airplane. (Cotton currently accounts for about 80% of the U.S.$5 to 10 million pesticide market in Mozambique, according to the PRS/DSV/DANIDA.)

Dr. George Georghiou, a University of California, Riverside expert in insect resistance to pesticides, remarked (pers. comm.) that just one mosquito gene--the KDR (knock-down resistance) gene--constitutes the primary mechanism of resistance to ALL of the synthetic pyrethroids. Both larvae and adults are included in resistance buildup. Not knowing the amount of hectares sprayed for cotton versus the area sprayed for malaria control in Mozambique, he can not predict when resistance might first be observed, but said it is a strong possibility. Dr. Franco, although having no evidence yet for resistance buildup, also

considers it quite possible (he cited a recent article from 'Parasitology Today' on mosquito resistance to deltamethrin).

Dr. Georghiou recommended that the GOM Malaria Control Section consult with experts and with PRS/DSV/DANIDA as soon as possible and reserve certain suitable insecticides exclusively for malaria control. USAID/Mozambique should advise Dr. Franco, as well as Dr. Marina Pancas of the DSV and Drs. Jose Dulamo and Lars Kjer of PRS/DSV/DANIDA to initiate these consultations.

4.3 Applicable Mozambique, Regional and International Pest and Pesticide Management Resources and Expertise

Interviews indicated that project PVOs presently do not make use of pest and pesticide management resources and expertise that are available to them in-country and internationally. These are some contacts that might be useful. PVO staff should enlist the help of the Africa Bureau Environmental Advisor and of senior technical officers in their own organizations in order to establish useful networks for information and technical support.

4.3.1 In-country Resources and Expertise

4.3.1.1 Ministry of Agriculture (MOA)

The MOA includes several agencies which should be involved in IPM implementation in Mozambique.

The **Plant Protection Department (DSV)** places great importance on developing IPM methods appropriate for the family farm, food crop sector, and there is already much applicable technology. The DSV is in the process of publishing an entire series of crop protection manuals covering cereals, root and tuber crops, vegetables and leguminous crops (Segeren and van den Oever 1993, Segeren et al. 1993 and in press, van den Oever and Segeren 1993a, 1993b). Principal attention is given to describing effective non-chemical pest control measures, with pesticide application information in case of need. The IPM methodology described draws from earlier work in-country such as the development of an IPM system for irrigated maize in southern Mozambique (Segeren and van den Oever 1993) and selection of pest-resistant food crop varieties over the years by the government seed production parastatal, Sementes Mocambicanas (SEMOC).

The DSV is currently continuing or initiating the following programs:

– "Improving Phytosanitary Conditions in Eastern and Southern African Countries at Risk to the Larger Grain Borer" (FAO/EEC 1991), which includes six months of in-country training by an expatriate specialist from the U.K. Natural Resources Institute;

-- Biological control of the cassava mealybug, initiated with parasite releases which are now being evaluated with assistance from the International Institute of Tropical Agriculture (IITA);

-- Biological control of the cassava green mite, initiated;

-- Biological control of maize stalk borers, to be initiated;

-- Integrated control of the multimammate rat;

-- Screening of botanical pesticides, including neem;

-- Pesticide registration;

-- A functional Migratory Pest Unit, assisted by the GTZ project "Strengthening and Coordination of Migrant Pest Control in the Southern African Development Coordination Conference (SADCC) Regions," which addresses locusts, birds, armyworms and rodents (Lawrynowicz 1990, Nyirenda 1991b). This unit cooperates with international organizations such as the U. N. Food and Agriculture Organization (FAO), IRLCO-CSA and DLCO-EA;

-- Plant Quarantine;

-- Training provincial and district MOA officers; and

-- Conducting a public awareness campaign on the side effects of pesticide use.

The DSV is being reinforced through the DANIDA project "Strengthening of Plant Protection," a long-term effort (nine years, starting in 1991) involving six expatriate staff: a Project Leader, an Entomologist, a Nematologist, a Plant Pathologist, an Agronomist/Biological Control Specialist, and a Pesticide Specialist who advises the pesticide registration program. Among other things, this project is responsible for helping develop the crop protection extension program nationwide.

The **National Directorate for Rural Development** (DNDR) is a central body that sets standards for the selection and hiring of extension staff, designs and gives courses, sets norms for extension activities and develops extension methodology and messages. The provision of extension services is entirely within the realm of the Provincial Directorate for Agriculture (PDA) through its provincial Rural Extension Service (RES) (World Bank 1992).

The **Center for Agrarian Training** (CFA) is a well-regarded institution with the lead responsibility for non-formal training for rural development in Mozambique. Its excellent physical facilities in Maputo house audio-visual equipment, a program of producing training materials using personal computers, and the capacity to conduct training by correspondence. Major training fields include training-of-trainers and social action and rural extension. The CFA supports and supervises Provincial Centers for Agrarian Training (CPFAs) which exist

in every province except Maputo. It is important to note that the CFA and CPFAs will be increasingly financially dependent on selling their services to programs that need to conduct training activities (World Bank 1993).

The National Institute for Agricultural Research (INIA) has recently been accorded responsibility for all MOA research. Budget restrictions and a shortage of technical expertise, coupled with extensive insecurity in rural areas, have resulted in an agricultural research infrastructure that is weak in overall facilities and staff and has produced few technologies suitable for the family subsector. One B.S.-level crop protection researcher is on staff at present and is testing botanical insecticides for stem borer control, in close collaboration with the DSV. However, she will probably leave for further training soon. In addition, an FAO entomologist is posted to Lichinga to conduct IPM research on maize and beans. INIA is also responsible for providing technical backstopping for Extension and for training Extension Subject Matter Specialists (SMSs) (World Bank 1992).

4.3.1.2 Other In-country Resources and Expertise

Eduardo Mondlane University. There is one Entomologist and one Plant Pathologist on the university faculty who lecture on crop protection.

World Bank. The World Bank is connected with two efforts which have a bearing on IPM implementation in Mozambique.

The first is the Agricultural Services Rehabilitation and Development Project in Cabo Delgado and Nampula Provinces in northern Mozambique, which focuses on the upgrading of agricultural services and provision of credit. Extension is to be improved (courses in agriculture and extension for field agents are to include IPM) and local-level farmer organizations encouraged. An Integrated Pest Management Specialist will be recruited to conduct applied research on appropriate IPM practices for cotton and food crops at INIA's Nampula research station and on farmers' fields. The IPM Specialist will also assist with training and extension. Senior Mozambican research officers will be sent abroad for post-graduate training, including IPM, and local technicians will receive short-term training in subjects such as pest management. Notably, the project is proposing a study to identify health hazards and other negative impacts caused by an anticipated increased use of pesticides under its aegis, and to develop an action plan for addressing them (World Bank 1992).

The World Bank, with the United Nations Development Programme (UNDP) is also supporting the development of a National Environmental Management Plan (NEMP). The NEMP should be closely coordinated with PVO activities. Preparation of the NEMP is being directed by the National Environmental Commission (CNA) with technical assistance from UNEP (U.N. Environmental Program) (Falloux and Lara-Resende 1992). Pesticides figure in all of NEMP's priority areas: coastal zone management, natural resource management, and urban and periurban problems (including those of Green Zone market gardening around Maputo).

UNDP The U.N. Development Programme is just initiating its "National Family Sector Agricultural Development Programme Pre-Programme," a two-year effort implemented by FAO in eight provinces, covering eight districts. The goals of the project are to reduce duplication of agricultural development programs, improve coordination within the agricultural sector, and strengthen MOA planning and implementation capacity at all levels. Special attention is to be given to decentralization, leading to strengthened provincial and district agricultural services.

4.3.2 Regional and International Resources

There are many centers of expertise for IPM technical support. The Africa Bureau Environmental Advisor can supply contact information.

Most CGIAR (Consultative Group for International Agricultural Research) **International Agricultural Research Centers** (IARCs) have field programs in Africa. The IARCs are forging stronger links to National Agricultural Research Systems (NARS), such as INIA. (The NARS themselves are an excellent resource which should be better utilized, and are forming regional research networks for specific commodities). Some examples are the:

-- International Center for Tropical Agriculture (CIAT), based in Cali, Colombia, has world responsibility for Phaseolus bean research. CIAT has a cassava outreach program in Brazil, significant because of cassava's importance in Mozambique and because both nations are Portuguese speaking;

-- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) conducts research on many species of tropical legumes, and the Centro International de Mejoramiento de Maiz y Trigo (CIMMYT) carries out research on maize and sorghum;

-- Centro International de la Papa (CIP) conducts research on numerous root and tuber crops;

-- International Institute of Tropical Agriculture (IITA), Centre for Plant Health Management, headquartered in Cotonou, Benin, has broadened its scope from an original focus on biological control; and

-- West Africa Rice Development Association (WARDA), based in Bouake, Ivory Coast.

At least two international agricultural research centers outside the CGIAR network also work in Africa:

-- The **International Centre of Insect Physiology and Ecology (ICIPE)**, in Nairobi, conducts IPM research for maize, sorghum and cowpeas, emphasizing resource-poor farmers. ICIPE developed and coordinates an African regional Pest Management

Research and Development Network (PESTNET) for the integration of pest management into national agricultural and livestock production systems.

-- The **Asian Vegetable Research and Development Center (AVRDC)** focuses on *non-chemical* pest management methods for tomato, pepper, eggplant, onions/garlic and cole crops. It recently began activities in sub-Saharan Africa through collaboration with the Southern African Centre for Cooperation in Agricultural Research and Training (SACCAR) for the SACCAR-AVRDC regional Collaborative Network for Vegetable Research and Development in Southern Africa. The network priority crops are tomato, onion, leafy vegetables and indigenous vegetables such as amaranths and African eggplant.

NGOs and PVOs are taking steps to provide their field projects and development collaborators with technical support, in some cases including research and development of appropriate technology and training approaches. Examples:

-- The African Pest and Environmental Management Foundation (APEMAF) in Uganda and the African Biodiversity Institute in Kenya are independent, non-profit organizations offering technical assistance, applied research, information, training and consultancy services relating to agromedicine and the environmental impacts of pesticides. Their key areas of expertise are: environmental assessment and management, occupational health, IPM, and integrated vector-borne disease management in rural development schemes.

-- The Rodale International Research Center in Senegal, investigating sustainable food cropping and training farmers in integrated crop management. A second research center is being considered for Zimbabwe.

-- CARE International has developed excellent guidelines for pesticide choice and use and IPM implementation. CARE's Agriculture and Natural Resources Coordinator is exploring the possibility of organizing an IPM workshop for African PVOs.

-- OXFAM has taken initial steps to organize an NGO/PVO IPM Action Network for Africa.

Internationally-focused European crop protection centers offer relevant IPM expertise and conduct agricultural research and development projects in Africa, including for food crop and vegetable IPM. Notable among them are repositories of ex-colonial agricultural information and skills such as the **Natural Resources Institute** in the U. K., the **Wageningen Agricultural University's Crop Protection Center** in the Netherlands, and the **Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement (CIRAD)** in Montpellier, France. Also, the German overseas technical assistance agency (GTZ) and Pesticide Service Project are very active in Africa, with three supraregional projects offering research and extension support in the areas of vegetable production and IPM for vegetables in several countries.

The United Nations agencies FAO and UNDP implement numerous donor-funded IPM research and development projects in Africa. FAO is the foremost organization promoting IPM in member countries, under the guidance of the FAO/UNEP Panel of Experts on Integrated Pest Control.

4.4 Mozambique's Ability to Regulate or Control the Distribution, Storage, Use and Disposal of Pesticides

4.4.1 Assessment of Pesticide Management Capabilities in Mozambique

Control of pesticides is difficult in Mozambique because the responsibility is fragmented. Formulation, manufacture and disposal of pesticides are under the Ministry of Health, registration and licensing fall to the Ministry of Agriculture, responsibility for transport belongs to the Ministry of Transportation, and importation falls under the Ministry of Commerce. For the large government importing firm INTERQUIMICA, importation of pesticides also involves the Ministry of Finance.

The limited control of pesticides until now and the general lack of education about them has led to considerable misuse. Inappropriate chemical selections and application procedures have resulted in significant hazards to human health, failures in the control of crop and storage pests, and likely pesticide resistance in cotton, the heaviest user of pesticides in Mozambique. Documentation of pesticide poisonings in-country is inadequate, but there was some discussion of them during SEA interviews. Belayneh (1993) noted that, "There is no single toxicology or related unit in the hospitals in Maputo that is well equipped to address pesticide poisoning...doctors and nurses are not trained to recognize pesticide poisoning or to use drugs or other necessary treatment."

4.4.1.1 Pesticide Legislation, Regulations and Enforcement

Mozambique has had pesticide legislation ("Regulamento sobre Pesticidas", Annex C.1) since 1987, but there has been virtually no enforcement of its complex laws. For example, the legislation stipulates that (Mozambican) Class I highly toxic pesticides can be used only by authorized persons (authorized by district Dept. of Agriculture (DDA) staff). In reality, there are currently no DDA staff to do the authorization and this rule is apparently greatly abused (Lars Kjaer, DANIDA, pers. comm.).

Under current conditions, it would be difficult in Mozambique to bring anyone to court on a misuse-of-pesticides charge. Enforcement of legislation regarding pesticide registration has not been possible because of the security situation, lack of trained personnel to inspect pesticide stocks for illegal entry or unsatisfactory labelling, and deliberate "under-the-table" importing by large joint venture operations (GRM with foreign firms). As the country has very limited staff to implement its pesticide laws, assistance should be sought from the FAO, particularly in encouraging regional cooperation (FAO/SADCC 1991).

At this writing, there is no program in place for the training, testing, certification, and licensing of pesticide applicators in Mozambique.

Because it is not likely that the Government of Mozambique will be able to enforce its pesticide legislation effectively in the near future, much of the responsibility for safe and effective pesticide use by PVOs must be borne by the PVO Support Project and the PVOs themselves.

The PRS/DSV/DANIDA has begun to train INIA technicians in warehouse inspection. Because of many other commitments, the PRS itself has not had the time to check pesticides as they enter the country. A formal short course for plant protection officers that will cover pesticide inspection, plant quarantine, etc. was planned for late 1993. It is hoped that after the course there will be at least one plant protection officer for each of Mozambique's 10 provinces. More than one year ago the PRS applied to the GRM for a permit for pesticide inspectors, but at this writing it still has not been granted.

There seems to be considerable traffic in unregistered pesticides in Mozambique. The Republic of South Africa and Swaziland are just hours away from Maputo, and the Beira and Limpopo Corridors serve as convenient conduits for pesticides from Zimbabwe. The PRS/DSV/DANIDA and INIA did a survey recently of pesticides stored at BOROR (the State-owned pesticide distributor until 1991), CAFUM (another pesticide distributor), a sugar plantation and a cotton facility, all in the coastal city of Beira. Of all the pesticides examined, only one was legal (registered in Mozambique and within the two-year expiration date). The SEA team made a short visit to a small CAFUM agricultural products store, also in Beira, and noted that of 21 pesticides for sale, eight were not registered and one was a banned product.

In order to lessen this illegal trafficking, the PRS/DSV/DANIDA is attempting to improve communications with the chemical companies. Regular meetings are now held with as many firms as will participate, and they are encouraged by the PRS/DSV/DANIDA to form an official association (see draft of constitution of the proposed association, Annex C.4). One purpose of such an association is to keep all members informed of current registration procedures and regulations. From the standpoint of the companies, an association would very likely help them by putting pressure on the GRM to buy pesticides from them in an official and legal manner, instead of buying directly from multinationals and bypassing Mozambique's registration procedures. LOMACO (a joint venture of the GRM and Lonrho-London) for example, was mentioned as one organization that typically doesn't pay duties but imports large quantities of pesticides for cotton and citrus, effectively ignoring registration. ICI, Ciba-Geigy and Agroquimicos are at least three large firms (of about 27 in all) that favor an association.

4.4.1.2 Registration and Licensing of Pesticides

The registration and licensing of pesticides in Mozambique is presently being carried out by the PRS/DSV/DANIDA, MOA. Those companies wishing to import and sell

pesticides must submit applications to both the Ministry of Agriculture (the PRS/DSV) and the Ministry of Health (MOH), along with efficacy and toxicological data. The petitioning importer/seller must also provide an example of the final label. Because it is not possible at this time to conduct the necessary research in Mozambique on pesticide efficacy (primarily because of a lack of trained personnel), data from other countries is allowed. Although some pesticide containers now have Portuguese language labels, temporary labels in English are still permitted so that those pesticides can be used provisionally. (The printing of labels in Mozambique may still be difficult, because the company Agroquimicos has its labels printed in Portuguese in The Republic of South Africa). In addition to efficacy and toxicological data, the following criteria are considered by the PRS for pesticide registration: the producer of the active ingredient, the concentration of the active ingredient in the product, the type of formulation, the formulator, and a Portuguese language label (suitable or provisional). It now typically takes from one to three months from application submission until product registration.

To import pesticides, a chemical company must first secure a letter of credit at a bank in Mozambique to guarantee payment. Then the government is notified by the bank so that the company wishing to import can be listed in the "Boletim de Registo de Importacao", which is the license to import chemical products. Mozambique laws require the granting of pre-import clearance prior to pesticide import, with the Ministry of Trade issuing permits for importation.

A license to sell registered pesticides is obtained by submitting an application to the Ministry of Commerce. The prospective seller (distributor) then receives a "Licenca de Representaçao do Ministerio do Comercio" ("Ministry of Commerce Representation License").

There has been steady improvement in the efficiency of registration of pesticides and licensing of distributors during 1993. Approximately 300 applications for registration have been received since 1987, but only approximately 180 pesticides have been registered (see Annex C.2). A very useful booklet was published in July 1993 by the PRS of the DSV: "Guia de Pesticidas Registados em Mocambique--1993" (Guide to Pesticides Registered in Mozambique--1993", Annex C.3). This guide not only lists the registered pesticides, but also provides information on each one, including: toxicity class, common and commercial names, types of pests controlled, company distributing the product, etc.

The "Guia" should be very useful for the PVOs in their agricultural programs. It should be mentioned however, that even though all the pesticides listed are registered, not all are available as yet in Mozambique. The PRS does not expect that to pose much of a problem, though: if a PVO wishes to purchase a registered pesticide not yet available in-country, it can request the relevant company to make it available. Assuming that there will be a reasonable demand for the product in Mozambique, the company should be willing to comply.

An additional step in upgrading the efficiency of the pesticide registration process in Mozambique was taken in August 1993 when the PRS put a new application form into use. The new form announces new registration rules and possible fines or other action if the rules are ignored. This gradual, more stringent and orderly approach should provide additional control over the registration process.

The PRS/DSV/DANIDA has also requested permission from the MOA to charge a one-time fee to be paid at the time of application submission. If the request is approved, the fees collected would go to the GRM for paying government workers. There is some question about the legality of charging a fee to register pesticides. The PRS might consider charging the companies a tax based on the toxicity of each pesticide and/or how much it is sold.

Another important step in improving pesticide registration is increased cooperation between the PRS and the MOH. Meetings are held every one to two weeks to review toxicity data on products already registered, which could mean the revoking of some registrations (perhaps any product with an active ingredient with an LD50 value of less than 100). Also under consideration by the PRS and MOH is the stipulation that donated pesticides must fall into (Mozambican) Class III (slightly toxic)(see Table 6).

Two significant problems that remain for the PRS in relation to pesticide registration are variable product quality and poor labelling. The parastatal Empresa Mocambicana de Pesticidas (EMOP), for instance, has formulated seven pesticides through the years, but "officially" is not doing so now (do Rosario and Mlambo 1992). EMOP has a reputation for low quality pesticides, partly because of a lack of functional laboratory equipment. During interviews, the SEA team also heard of numerous instances of no labels and poor labels on pesticides in many locations in Mozambique.

4.4.1.3 Mozambique's Pesticide Toxicity Classification System

Whereas the U.S. EPA has a system of four categories of pesticide toxicity, the PRS/DSV/DANIDA has decided to follow a three-class system for pesticide toxicity (highly, moderately and slightly), based on LD50 values. Table 6 compares the Mozambican system of pesticide toxicity classification to that of the EPA and the WHO (the WHO categories are widely used internationally).

According to Mozambican regulations, only (Mozambican) Class II and Class III pesticides can be used by smallholder farmers. Even though Classe I pesticides are prohibited for smallholders, the Mozambican authorities authorize their use for limited internal purposes in PVO programs (Lars Kjaer, pers.comm.).

4.4.1.4 Mozambican Pesticide Labels

Official PRS/DSV pesticide labels in Mozambique (see Annex E.1) state the toxicity class and present a SIGNAL WORD designated by the PRS/DSV/DANIDA based on LD50 values. The pesticide label signal words are similar for the "highly toxic" and "moderately

toxic" categories, i.e., "MUITO PERIGOSO" (Classe I) and "PERIGOSO" (Classe II)". Both of these labels bear a signal symbol of the skull and crossbones, as found on labels of EPA Category I pesticides. "Classe III" pesticides are considered "LIGEIRAMENTE TOXICO" (moderately toxic) and their labels bear a large "X" and the signal word "CUIDADO".

Proper labels also include the following: commercial name of the pesticide, common name, concentration of active ingredient, chemical classification (eg. pyrethroid), formulation type, net volume, registration number, type of pesticide (eg. picture of insects in a small square), the warning "Keep away from children", lot number, date of manufacture, shelf life (validity), name/address of manufacturer, distributor in Mozambique, safety precautions including type of protective clothing and apparatus needed, intoxication symptoms, first aid, medical treatment, use instructions, and storage and disposal information. PVOs should have little trouble in following instructions on such a clear and concise label.

4.4.1.5 Systems of Pesticide Procurement and Supply

Since the signing of the Peace Accords in Mozambique in October of 1992 there has been a period of stability which has allowed growth and development in many sectors of the economy. Pesticide importation, formulation and sale were formerly controlled by the State, but now a U.S.$5 to 10 million per year pesticide industry involves major private agrochemical companies such as Ciba-Geigy, Shell Mozambique, Bayer, ICI, etc. Because approximately 80% of the current pesticide market is for cotton (mainly insecticides), a considerable amount of pesticides is probably still brought into the nation illegally by joint ventures, as mentioned above.

INTERQUIMICA, the State-controlled importer of pesticides (formerly the sole importer), still receives donated pesticides from the Japanese Government through the KR-II (Kennedy Round) program[2] with the MOA. However, imports are slowing down (the last was in December, 1992), and it is likely that the entire operation will be privatized.

BOROR Commercial, the former State-run principal pesticide distributor, went bankrupt in 1991 and is now selling old pesticide stocks (albeit very slowly) to pay staff and workers. The GRM would probably have to intervene if BOROR were to be kept viable. During the 1989/90 and 1990/91 cropping seasons, BOROR distributed 6,500 tons of fertilizers, 27,400 kg of fungicides, 130,500 kg of herbicides and 95,000 kg of insecticides. BOROR still stores substantial quantities of these products in its warehouses at its northern, central and southern centers. For an account of how pesticides were imported and

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[2] To increase food production and reduce foreign debt in Mozambique, the Japanese Government "donates" pesticides to the GRM. The Japanese government ships pesticides that it buys from chemical companies in Japan, which are invited to submit bids. The principal bidding companies are Sumitomo, Mitsui, Mitsubishi, Marubene and Nisho Iwai. Every effort is being made now by the PRS/DSV/DANIDA to ensure that the donated pesticides have been registered both in Mozambique and in Japan before importation. Bids in 1993 were won by Sumitomo and Mitsui, the two Japanese companies with pesticides registered in the "Guia".

distributed, as well as other aspects of pesticide "flow" in Mozambique during the period of strict government control, the reader is referred to the 1984 REDSO/ESA Regional Pesticide Advisor trip report (Jensen 1984).

EMOP (mentioned above), is not at present an important supplier of pesticides to the Mozambican market. It does not have any registered pesticides in the "Guia" published by the PRS/DSV/DANIDA.

Aside from LOMACO and similar large companies linked to the GRM, INTERQUIMICA, and EMOP, at least 27 private companies are represented. In descending order, by the number of pesticides registered in the "Guia", 12 of the companies are: Agroquimicos, ICI, Ciba-Geigy, Quimigal, Shell, Sentrachem, Enacomo, Sumitomo, Mitsui, Sapec, Neoquimica and J.F.S. Some of those 12 firms act as agents for others. Agroquimicos, for example, sells for Uniroyal, Cyanamid, FMC, Monsanto, Bayer, BASF, Shell and Milborrow. ICI sells for DuPont, Hoechst, Rhone-Poulenc, Schering, Zeneca Agrochemicals Ltd., and Zeneca Public Health. And so on. Another large company that distributes pesticides is CAFUM, with outlets in the cities of Maputo, Xai Xai, Inhambane, Beira, Chimoio, Quelimane, Nacula, Nampula, and Tete. In terms of numbers of pesticides registered in the "Guia", Agroquimicos, ICI, and Ciba-Geigy account for 59.3% of the total. Interviews with representatives of those companies indicate that the private sector will develop very rapidly if peace holds in Mozambique.

There is no single authoritative source of information about how or where pesticides are currently entering Mozambique, but principal entry routes by sea are the ports of Maputo, Beira and Nacala (primarily imports from the U.S., Europe and Japan). Principal routes by land are into the province of Maputo (from South Africa and Swaziland), into the province of Gaza (from S. Africa and Zimbabwe), and into Manica and Tete provinces (from Zimbabwe). The Beira and Limpopo Corridors serve as east-west "conduits" for rapid pesticide movement. With so many points and routes of entry, increased demand for pesticides, lack of trained personnel to monitor pesticide importation, and the aforementioned fragmented system of pesticide control, considerable illegal importation occurs. Perhaps because of the speed and ease of obtaining pesticides from bordering nations (in one or two days a shipment can be brought in from South Africa or Swaziland), Agroquimicos is currently the only company keeping significant stocks of new pesticides in-country.

4.4.2 Suspension of Pesticide Subsidies to the Private Sector, Including Smallholder Farmers

Although several interviewees remarked that pesticide prices in Mozambique are below world market levels at present, it appears that subsidies by the GRM for purchase of pesticides are largely a thing of the past. With the exception of LOMACO and similar joint ventures, INTERQUIMICA and possibly EMOP, past subsidies to pesticide distributors were mainly a function of the instability caused by war and drought, and consistent with the former socialist political order.

This discontinuation of any form of pesticide subsidy accords with USAID policy, which opposes subsidies and supports private sector supply of agricultural inputs. Therefore, *except for very limited experimentation and demonstration purposes* for which PVOs could supply small amounts of agrochemicals to farmers, *farmer beneficiaries of PVOs must be required to pay in full on the open market for any pesticides they wish to use*. Also, except in narrowly-defined, infrequent emergency situations, *no free or subsidized pesticide applications* should be made on smallholder farms.

4.4.3 Pesticide Stewardship: Manufacture to Disposal

Responsible stewardship of pesticides involves every step in the pesticide's "life", in order to ensure the safety of people, the protection of the environment, and the effectiveness of the product. Initial stewardship responsibility falls on the shoulders of the manufacturer, and in the case of Mozambique this means mostly European, U.S. and Japanese producers because most pesticides now used in-country are imported. Since Mozambique now has reasonable pesticide legislation and a well-functioning registration scheme, there is some control over pesticide importation, distribution and sale. Once registered and imported, the pesticides must be properly warehoused, transported, sold, stored, used and disposed of. While much remains to be done in order to achieve proper pesticide stewardship in Mozambique, encouraging progress appears to be underway at present, partly through significant support from pesticide manufacturers and distributors (see 4.4.1.1).

4.4.3.1 Pesticide Formulation

In-country formulation of limited types and quantities of pesticides does occur in Mozambique. Formerly, the State-owned chemical importing company INTERQUIMICA handled all importation while EMOP and private companies such as Shell Chemicals Mozambique handled in-country formulation, re-formulation and packaging. EMOP is presently moribund, but private facilities presumably operate as before (Belayneh 1993).

4.4.3.2 Training Pesticide Dealers

A facet of responsible pesticide stewardship on the part of chemical manufacturers and distributors is the training of pesticide sellers or dealers, i.e., those managing small agricultural products stores. There appears to be a definite need for it. For instance, in a CAFUM store in Beira that was generally tidy and well stocked (pesticides, some safety gear and a few sprayers), containers of Voloton 300 UL (phoxim) and 2,4-D 72% active EC were left open on a pallet so the customers could serve themselves (buyers bring their own containers). Although phoxim is an EPA Category III pesticide, it is not registered yet in Mozambique. The second pesticide, 2,4-D, was banned in Mozambique years ago. The team was told of another outlet in Beira with much spilled pesticide from countless decanting efforts, and other signs of poor shop keeping. Shell Chemical Company has implemented numerous international training courses for pesticide dealers (and smallholder farmers) to prevent this sort of poor stewardship.

4.4.3.3 Cleanup of Obsolete Pesticides

Some efforts are underway in Mozambique to begin the cleanup of obsolete pesticide stocks, many of which are relics of the State-run economy. One example of responsible stewardship is the Shell undertaking in Beira in which leaking drums of aldrin, DDT, monocrotophos and perhaps other pesticides are being properly disposed of. After transfer of the chemicals to new drums, and removal and packing of contaminated soil, sand, etc., into drums, the entire shipment will go to Germany under the direction of the GTZ, to be disposed of correctly. The operation is expected to cost at least U.S.$750,000.

4.4.4 Training and Technology Dissemination

4.4.4.1 Government, Aid Donors and PVOs/NGOs

Staffing and functioning of government agencies at the local level must be restored now that civil war appears to be over. For the most part the attendant training efforts are just starting, and the only government agricultural staff in many areas are those that have been seconded to PVOs. Much of the pest and pesticide management training that will take place in the near future, both for government officers and for farmers, will inevitably be delivered under the auspices of development aid programs. For instance, since 1992 DANIDA has been assisting the MOA and DSV in organizing an extensive series of training courses in damage assessment, IPM, pesticides, and post-harvest pest control for provincial and district technicians.

With support from DANIDA specialists, the DSV is mandated to assume responsibility for training extension staff and providing technical support to extension agencies in the areas of crop protection and pesticide management. (See 4.3.1.1 for a description of GOM extension organization and extension training facilities). At the time of this writing, it was unclear to what extent the training plan had been implemented.

During the SEA team's visit, the DSV held a national-level IPM workshop for provincial agricultural staff. The workshop was organized as a follow-up to a donor-funded (IPM Working Group) Eastern/Central/Southern Africa Workshop on IPM Implementation held in Harare, Zimbabwe in April 1993. Among the topics covered were the definition of IPM and practical examples of IPM implementation in Africa. DSV staff regarded the workshop as the participants' first experience with the subject, though in fact, as described above, provincial officers may have already received some IPM training. There appears to have been very little communication between PVOs and the DSV regarding research, information, training and other areas of mutual interest.

4.4.4.2 Role of Dealers and Distributors

Pesticide firms can be an excellent source of information for PVOs regarding proper pesticide application and appropriate safety measures[3]. All six distributors interviewed[4] provide some technical (as well as marketing) training for their field representatives in correct use of their products, including pesticides. Ciba-Geigy has the most extensive in-house training programs, all of which are coordinated from Switzerland. They are aimed at technical staff, as well as at smallholder farmers cooperating in the company's crop research projects.

Ciba-Geigy/LOMACO's 1992/93 Olima Project at Montepuez (von Krosigk 1993) involved 34 families that cultivated a total of 42.5 ha of cotton and 19.5 ha of maize. The project's technology "packages" consisted of improved land preparation, seeds, chemical fertilizers, synthetic insecticides and herbicides, and some IPM tactics. This new technology was disseminated through participating farmer leaders/cooperators. Company specialists and technicians supported the project throughout the growing season (the first since the war's end) by visiting weekly to solve any problems and by holding several training courses. Training topics included pesticide safety and application techniques--the importance of no smoking, eating or drinking during spraying operations; having soap and water at hand for clean up; spraying so as to avoid contact by the pesticide with the skin; and how to design and correctly use a protective apron made from low-cost plastic woven fertilizer bags. Trainees also were taught the types of pests, the damage they cause, and the benefits of predatory insects. IPM scouting techniques for cotton were demonstrated by an extensionist so that participants would be able to identify principal pests, determine their densities, and choose the correct pesticides, pesticide quantities and spraying dates.

Where the technical "packages" worked reasonably well, the farmers' response was very positive. Maize yields improved from about 0.8 metric tons (t)/hectare (h) to 4.1 t/ha, whereas yields of cotton increased from 0.5 t/ha to 2.1 t/ha. Many of the 34 families that first signed on with the project want to continue next season, and more than 450 families have registered to participate.

Another example of technology dissemination is ICI's close collaboration with Dr. Almeida Franco of the Malaria Control Section of the MOH, with a view to improving mosquito vector control programs.

Ciba-Geigy has published a number of high-quality pesticide safety publications that are distributed to participants in various short courses. They include the comprehensive

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[3] Many other practical reference sources exist to assist PVOs in safe and rational use of pesticides. A few are: 1) Pesticide User's Guide - A Handbook for African Extension Workers (Overholt and Castleton 1989), available in Portuguese; 2) Pest Management Guidelines of The Agency for International Development (USAID 1991i); 3) Provisional Environmental Guidelines for PVO/NGO Field Use in Africa (USAID, in draft); and 4) the Farm Chemicals Handbook - 1993 (Meister Publishing Co. 1993). Items 1 to 3 are available through USAID.

[4] Agroquimicos, ICI, Ciba-Geigy, Sumitomo, Neoquimica and Shell.

safety manual "Safety Depends on You", available to trainees in Spanish or English (Ciba-Geigy 1988). Five booklets produced by GIFAP (the International Association of Manufacturers of Agrichemical Products) are available in-country (see Bibliography). Some GIFAP publications are now available in Portuguese and would be excellent references for PVO staff involved in agricultural activities. Ciba-Geigy Corp. is probably in a position to furnish each PVO with a free copy of each of those publications if asked[5]. The safety manual has much useful information on personal protective equipment (PPE), such as the best materials for boots and gloves (durability, resistance to solvents, ease of washing, etc.). PPE is available in larger cities of Mozambique, especially Maputo.

[5] Ciba-Geigy's telephone numbers in Maputo are: 49 25 17, 49 05 27, or 49 07 52. GIFAP's address is: Avenue Albert Lancaster 79a, B-1180 Bruxelles, Belgium. Tel.: +32/2 375 68 60; Fax: +32/2/375 27 93.

5.0 MANAGEMENT OF PESTICIDES UNDER THE PVO SUPPORT PROJECT IN RELATION TO USAID ENVIRONMENTAL AND PESTICIDE PROCEDURES

5.1 Basis for Selection of Pesticides

USAID guidelines governing pesticide choice take both health and environmental considerations into account and refer chiefly to the U.S. Environmental Protection Agency (EPA) registration status of pesticides proposed for use. They apply to the PVO Support Project and all other A.I.D.-funded agricultural development projects that use pesticides. PVO Support Project staff must use these guidelines when deciding which pesticides are allowable for purchase and/or application with A.I.D. support:

-- *To the extent possible, use only pesticides that EPA has registered as General Use Pesticides (GUPs) for the crops or veterinary purposes in question.* In the U.S., GUPs can be purchased and used without restriction because the EPA has determined that they present minimal hazard to humans and the environment if used according to label instructions. GUPs generally fall into Mozambican pesticide toxicity categories Class II and Class III, which categories are allowable for smallholder farmer use according to Mozambican law.

-- EPA-registered Restricted Use Pesticides (RUPs) (Annex D.1) can be purchased and applied in the U.S. only by certified, licensed applicators or persons directly supervised by them. RUPs generally are either very toxic, their use being considered too hazardous for persons who have not received special training, or their residues persist too long in organisms or in the environment. They may cause serious harm even when used according to the label. For these reasons, RUPs are usually unsuitable for use in USAID projects. *If no GUPs are available and effective for a given project use pattern, RUPs with an EPA registration for that use may be used, but only for internal project purposes (not for extension to farmers), with suitable safety precautions and applied only by appropriately-trained project staff or under their direct supervision.* Most RUPs are assigned to Classes I or II in the Mozambican pesticide registration scheme.

-- Mozambican regulations, which USAID projects must respect, *prohibit the use of pesticides in Mozambican Class I* by smallholder farmers. Class I pesticides thus can not be chosen *for extension to PVO beneficiaries.*

-- If no EPA-registered GUP or RUP is effective or available for a desired use pattern, *pesticides for which the FAO/WHO Codex Alimentarius Commission has established Maximum Residue Limits (MRLs) for the crops or agricultural products in question and an Acceptable Daily Intake (ADI)* may be used providing that project use patterns do not result in those limits being exceeded.

-- *Pesticides must not have been cancelled, withdrawn, or suspended in the U.S.* because of health or environmental concerns.

-- *Pesticides must be registered in Mozambique and purchased in-country.*

-- If you have a choice of pesticides, use the *least toxic* active ingredients and formulations. An excellent source of toxicity and registration information is the "Farm Chemicals Handbook" (Meister Publishing Co. 1993). A copy of this handbook and ordering information are available at USAID/Maputo.

5.1.1 EPA Registration Status of Pesticides Proposed

Pesticides proposed herein for use by the PVO Support Project (Tables 1-4) were chosen according to the guidelines in 5.1 above. They are all GUPs in EPA toxicity categories II, III and IV, and are registered for use in the U.S. on the crops shown in the tables. They are available in-country now or can probably be obtained through Mozambican pesticide distributors (see 4.4.1.2).

No suitable pesticide is presently available for the control of ticks and other ectoparasites on livestock by smallholder farmers. The only product registered in Mozambique for this purpose, chlorfenvinphos, is a RUP in the U.S. PVOs and the PVO Support Project should encourage registration of admissable alternatives by the appropriate agrochemical dealers.

5.1.2 The Effectiveness of the Proposed Pesticides for the Expected Uses

Effectiveness entails applying the pesticide at the correct time, at the proper rate, with proper application equipment and technique, and only when and where needed. Thus, effectiveness results in large part from correct, rational use.

The proposed GUPs are presumed to be effective for contolling specific pests if used as directed on the pesticide label. They have been shown to be safe and effective when used according to label instructions in other nations with pests/crops/agroecosystems similar to those of Mozambique (e.g. South Africa, Swaziland and Zimbabwe). Many of the proposed pesticides have been tested by European, U.S. and Japanese firms in many nations. Some of them are now being tested for safety and efficacy under Mozambican conditions. Verified data on their efficacy in Mozambique are virtually nonexistent at present.

5.1.3 Pesticides Not Currently Acceptable for Use in Connection with USAID-funded PVO Support Project Activities

The Mozambique-registered EPA Restricted Use Pesticides (RUPs) listed in Table 5 should not be used by PVO staff until said staff have received appropriate training, and are NOT to be provided or extended by PVOs to farmers. In the future, appropriately trained PVO staff may use RUPs (a) on a limited basis for internal project purposes such as research and demonstration plots or seed multiplication plots, or (b) when assisting farmers on an

emergency basis during a pest outbreak[6]. Such future use would have to remain strictly within and under the direct control of PVOs.

In order to use a RUP in accordance with USAID regulations, PVOs must:

-- determine that the RUP in question could not be substituted by a GUP, and/or that there would be serious losses occurred if the RUP were not used;

-- use the RUP only on a limited basis for internal project purposes or on an emergency basis during a pest outbreak; and

-- ensure that application of the selected RUP is made only by, or under the direct supervision of, PVO personnel who have been properly trained according to U.S. EPA standards. A dated notice of permission to apply RUPs should be issued to those who successfully complete intensive training and an exam. Refresher training and re-examination should be carried out at reasonable intervals (see 5.7.1.1).

[6] The following nine insecticides were recently approved by USAID as an update to the 1989 Programmatic Environmental Assessment (PEA) for locust/grasshopper control in Africa and Asia (see Annex B.4): acephate, bendiocarb, carbaryl, chlorpyrifos, diazinon, fenitrothion, lambda-cyhalothrin, malathion and tralomethrin. All of these chemicals are currently registered by the U.S. EPA or its equivalent in other countries. The first three, acephate, bendiocarb and carbaryl, have not yet been registered in Mozambique, and so can not be used there unless PRS/DSV/DANIDA is consulted first and authorizes their use. Five are Restricted Use Pesticides in the U.S. (Pesticide Information Network of the U.S. EPA Office of Pesticide Programs, Sept. 1993 (also see Annex D.1)): bendiocarb, chlorpyrifos, fenitrothion, lambda-cyhalothrin and tralomethrin. Great caution should be taken to ensure that these RUPs are not used by PVOs except under the conditions described in this section.

Table 1. Pesticides Acceptable for Use in the USAID/Mozambique PVO Support Project on **Fresh Cereal Grains, Roots and Tubers**. An "X" in a crop column signifies EPA registration for that crop. The crop names are: MAI = maize, SOR = sorghum, MIL = millet, RIC = rice, CAS = cassava, SWP =sweet potato. POT = potato, TUR = turnip.

Pesticide (common name)	EPA Registration Status on Requested Crops							
	Grains				Roots and Tubers			
	MAI	SOR	MIL	RIC	CAS	SWP	POT	TUR
INSECTICIDES/ACARICIDES:								
Allethrin[18,NRM]	X[2]	X[2]				X	X	X
B.t.[NRM]	X	X	X	X	X	X	X	X
Diazinon	X	X		X[13,17]	X	X	X	X
Dimethoate	X[9]	X					X	X
Malathion	X	X[1]		X[1]		X	X	X
Pirimicarb							X[13]	X[13]
Pirimiphosmethyl	X	X						
Propargite	X	X[13]					X	
Pyrethrins[NRM]	X[2]	X[2]		X[2]		X[2]	X[2]	
Trichlorfon	X[9]							X[13]
FUNGICIDES:								
Benomyl[8]				X		X		X
Carboxin[5]	X	X		X				
Mancozeb[8]	X						X[12]	X
Metalaxyl	X	X	X	X		X	X	
Propiconazole				X				
Thiophanatemethyl				X[10]			X[10,13]	
HERBICIDES:								
Bentazone	X	X		X				
Butachlor				X[11]				
Diquat	X	X	X	X	X	X	X	X
Diuron	X	X					X	
Glyphosate	X[9]	X[9]	X[9]	X[9]		X	X	X
Metolachlor	X	X	X	X			X	
Metribuzin	X						X	
Oxadiazon				X[9]				
Pendimethalin	X	X		X			X	
Prometryn	X							
Quinclorac				X				
Terbutryn		X[9]						
Thiobencarb				X				
RODENTICIDES:								
Bromadiolone								
Warfarin[NRM]								

Note: See footnotes on following page.

Footnotes:

1. Pre- and post-harvest application.
2. Post-harvest application.
5. Not registered alone, but in combination with thiram.
8. Some uses have recently been lost for benomyl, captan and mancozeb.
9. Negligible residue tolerance.
10. Tolerance pending.
11. Temporary tolerance.
12. Interim tolerance.
13. Tolerance obtained from FAO Codex Alimentarius - Pesticide Residues in Food, Second Edition, 1993.
17. Tolerance is for polished rice.
18. Exempted from tolerance only when applied to growing crops.

NRM "Not Registered in Mozambique." Must be registered before use. PVOs can requestindustry to have pesticides registered through PRS/DSV/DANIDA. PVOs should first contact the latter to see what steps can be taken.

Note: Two potentially useful herbicides for maize, alachlor and atrazine, for PVO internal use, are still in the EPA Special Review process and are presently RESTRICTED USE PESTICIDES (RUPs). Their current status in Special Review must be determined, and their restrictions removed, before they can be utilized by PVOs.

Table 2. Pesticides Acceptable for Use in the USAID/Mozambique PVO Support Project on Certain Root Crops, Onions & Garlic, and Cruciferous Vegetables. An "X" in a crop column signifies EPA registration for that crop. The crop names are: CAR = carrot, RAD = radish, GAR = garlic, ONI = onion, COL = collards, CAB = cabbage, CHB = Chinese cabbage, BRC = broccoli.

Pesticide (common name)	EPA Registration Status on Requested Crops							
	Root Crops		Garlic and Onion		Cruciferous Vegetables			
	CAR	RAD	GAR	ONI	COL	CAB	CHB	BRC
INSECTICIDES/ACARICIDES:								
Allethrin[10,NRM]	X	X	X	X	X	X	X	X
B.t.[NRM]	X	X	X	X	X	X	X	X
Diazinon	X	X		X	X	X	X	X
Dimethoate	X[13]			X[7,13]	X	X		X
Malathion	X	X	X	X	X	X	X	X
Pirimicarb		X		X[7,13]		X[13]		X[13]
Pirimiphosmethyl	X[13]			X[13]		X[13]		
Sulfur[10]	X							
Trichlorfon	X[9]	X[13]			X[9]	X[9]		
FUNGICIDES:								
Benomyl[8]	X		X		X	X	X	X
Mancozeb[8]	X			X[7]				
Metalaxyl	X	X	X	X	X	X	X	X
Thiophanatemethyl				X				
Thiram[6]				X[7]				
HERBICIDES:								
Diquat	X	X			X	X	X	X
Glyphosate	X	X	X	X	X	X	X	X
Metolachlor						X		
Metribuzin	X							
Pendimethalin			X	X[7]				
Thiobencarb	X							

Footnotes:

6. Not registered alone, but in combination with carboxin.
7. Dry bulb onions.
8. Some uses have recently been lost for benomyl, captan and mancozeb.
9. Negligible residue tolerance.

13. Tolerance obtained from FAO Codex Alimentarius - Pesticide Residues in Food. Second Edition, 1993.

18. Exempted from tolerance only when applied to growing crops.

NRM "Not Registered in Mozambique." Must be registered before use. PVOs can requestindustry to have pesticides registered through PRS/DSV/DANIDA. PVOs should first contact the latter to see what steps can be taken.

Note: Two potentially useful herbicides for maize, alachlor and atrazine, for PVO internal use, are still in the EPA Special Review process and are presently RESTRICTED USE PESTICIDES (RUPs). Their current status in Special Review must be determined, and their restrictions removed, before they can be utilized by PVOs.

Table 3. Pesticides Acceptable for Use in The USAID/Mozambique PVO Support Project on **Lettuce, Legume Crops, Peppers and Tomatoes.** An "X" in a crop column signifies EPA registration for that crop. The crop names are: LET = lettuce, GRN = green beans, MUN = mung beans, COW = cowpeas, PGN = pigeon peas, PNT = peanuts, PEP = peppers, TOM = tomatoes.

Pesticide (common name)	EPA Registration Status on Requested Crops							
	Lettuce	Legume Crops					Peppers and Tomatoes	
	LET	GRN	MUN	COW	PGN	PNT	PEP	TOM
INSECTICIDES/ACARICIDES:								
Allethrin[18,NRM]	X	X					X	X[2]
B.t.[NRM]	X	X	X	X	X	X	X	X
Diazinon	X	X		X		X	X	X
Dimethoate	X	X					X	X
Malathion	X[13]	X		X		X[1]	X	X
Pirimicarb	X[13]	X[13]					X[13]	X[13]
Pirimiphosmethyl	X[13]	X[13]				X[11]	X[13]	X[13]
Propargite		X[13]				X[13]		X[13]
Pyrethrins[NRM]		X[2]				X[2]		X[2]
Sulfur[18]		X				X	X	X
Trichlorfon	X[9]	X[9]		X[9]		X[9]	X[9]	X[9]
FUNGICIDES:								
Benomyl[8]		X				X	X	X
Captan[8]								X[1,13]
Carboxin[5]		X				X		
Mancozeb[8]						X		
Metalaxyl	X	X	X	X	X	X	X	X
Propiconazole						X[13]		
Sulfur[18]		X				X	X	X
Thiophanatemethyl	X[13]	X				X[9]		X[13]
Thiram[6]								X
HERBICIDES:								
Bentazone		X				X		
Diquat	X	X	X	X	X	X	X	X
Glyphosate	X	X[9]	X[9]	X[9]	X[9]		X	X
Metolachlor		X	X	X	X	X	X	
Metribuzin								X
Pendimethalin						X		
Prometryn					X			

Note: See footnotes on following page.

Footnotes:

1. Pre- and post-harvest application.
2. Post-harvest application.
5. Not registered alone, but in combination with thiram.
6. Not registered alone, but in combination with carboxin.
8. Some uses have recently been lost for benomyl, captan and mancozeb.
9. Negligible residue tolerance.
11. Temporary tolerance.
13. Tolerance obtained from FAO Codex Alimentarius - Pesticide Residues in Food, Second Edition, 1993.
18. Exempted from tolerance only when applied to growing crops.
19. Plant bed tomatoes only.

NRM "Not Registered in Mozambique." Must be registered before use. PVOs can requestindustry to have pesticides registered through PRS/DSV/DANIDA. PVOs should first contact the latter to see what steps can be taken.

Note: Two potentially useful herbicides for maize, alachlor and atrazine, for PVO internal use, are still in the EPA Special Review process and are presently RESTRICTED USE PESTICIDES (RUPs). Their current status in Special Review must be determined, and their restrictions removed, before they can be utilized by PVOs.

Table 4. Pesticides Acceptable for Use in the USAID/Mozambique PVO Support Project on Eggplant, Okra, Cucurbit Vegetables, Citrus and Cashews. An "X" in a crop column signifies EPA registration for that crop. The crop names are: EGG = eggplant, OKR = okra, MEL = melon, CUC = cucumber, SQU = squash, CIT = citrus, CHW = cashew.

Pesticide (common name)	EPA Registration Status on Requested Crops						
	Eggplant and Okra		Cucurbit Vegetables			Citrus and Cashews	
	EGG	OKR	MEL	CUC	SQU	CIT	CHW
INSECTICIDES/ACARICIDES:							
Allethrin[18,NRM]			X[2]			X	
B.t.[NRM]	X	X	X	X	X	X	X
Diazinon			X	X	X	X	
Dimethoate			X			X	
Malathion	X	X	X	X	X	X	
Pirimicarb	X[13]			X[13]		X[13]	
Pirimiphosmethyl				X[13]		X[13]	
Propargite				X[13]		X[13]	
Pyrethrins[NRM]			X[3]			X[4]	
Sulfur[18]			X		X	X	
Trichlorfon	X[13]					X[9]	
FUNGICIDES:							
Benomyl[8]			X	X	X	X[1]	
Mancozeb[8]			X	X	X		
Metalaxyl	X	X	X	X	X	X	
Oxythioquinox						X	
Sulfur[18]			X		X	X	
Thiophanatemethyl			X	X	X		
HERBICIDES:							
Bromacil						X	
Diquat	X	X					
Diuron						X	
Glyphosate	X	X	X	X	X	X	X
Metolachlor							X
Oxadiazon							X
Prometryn			X	X	X	X	

Note: See footnotes on following page.

Footnotes:

1. Pre- and post-harvest application.
2. Post-harvest application.
3. Muskmelon post-harvest only.
4. Oranges post-harvest only.
8. Some uses have recently been lost for benomyl, captan and mancozeb.
9. Negligible residue tolerance.
13. Tolerance obtained from FAO Codex Alimentarius - Pesticide Residues in Food, Second Edition, 1993.
18. Exempted from tolerance only when applied to growing crops.

NRM "Not Registered in Mozambique." Must be registered before use. PVOs can requestindustry to have pesticides registered through PRS/DSV/DANIDA. PVOs should first contact the latter to see what steps can be taken.

Note: Two potentially useful herbicides for maize, alachlor and atrazine, for PVO internal use, are still in the EPA Special Review process and are presently RESTRICTED USE PESTICIDES (RUPs). Their current status in Special Review must be determined, and their restrictions removed, before they can be utilized by PVOs.

Table 5. **Pesticides Not Acceptable for Use By Farmers** in Connection with USAID/Mozambique PVO Support Project: U.S.E.P.A. **Restricted Use** Insecticides, Acaricides and Nematicides Currently Registered in Mozambique, with Representative Commercial Products Indicated[1].

PESTICIDE GENERIC NAME	COMMERCIAL PRODUCTS
INSECTICIDES	
Aluminum phosphide (fumigant)	PHOSTOXIN
Carbofuran	CARBOFURAO, CURRATERR
Cyhalothrin (lambda-cyhalothrin)	CYHALON
Cyfluthrin	BAYTROID
Cypermethrin	CIPERMITRINA, CYMBUSH, POLYTRIN, RIPCORD
Chlorpyrifos	DURSBAN, PIRINEX
Deltamethrin[2]	DECIS
Demeton-S-methyl	METASYSTOX
Esfenvalerate or S-fenvalerate	SUMI-ALPHA 1
Fenitrothion	SUMITHION
Fenvalerate	SUMICIDIN
Isazofos	MIRAL
Isofenphos	OFTANOL
Lambda-cyhalothrin	ICON, KARATE
Methamidophos	TAMARON
Methidathion	SUPRATHION, ULTRACIDE
Methomyl	METHOMEX
Monocrotophos	AZODRIN, NUVACRON
Phosphamidon	DEMICRON
Profenofos	ASTRA, CURACRON, SELECRON
Tralomethrin	TRALATE
Cypermethrin + Profenofos (both chemicals restricted use)	POLYTRIN
Permethrin + Pinaminaforte + Tetramethrin (for domestic use Permethrin restricted use)	AEROSOL DRAGON
ACARICIDES	
Methamidophos	TAMARON
Methidathion	SUPRATHION, ULTRACIDE
Profenofos	ASTRA,CURACRON, SELECRON
Chlorfenvinphos	SUPONA 30
NEMATICIDES	
Carbofuran	CARBOFRAO, CURRATERR
Isazofos	MIRAL

Continued on following page.

Table 5 (continued).

PESTICIDE GENERIC NAME	COMMERCIAL PRODUCTS
HERBICIDES	
Alachlor	ALACLORO, ALACLORO-SENTRACHEM, CALACLORO, LASSO
Atrazine	ATRAZINA, ATRAZINA-SENTRACHEM, CALLITRAZ, GESAPRIM
Cyanazine	FORTROL
Paraquat	GRAMOXONE
Atrazine + Cyanazine (both chemicals restricted use)	BLADEX PLUS
Atrazine + Triazine (at least atrazine restricted use)	BAC ATRAZINA
Bromoxynil + MCPA (both chemicals restricted use)	BROMOXINIL + MCPA
Ioxynil + Bromoxynil (bromoxynil restricted use)	OXITRIL
Mecoprop + Dichlorprop + MCPA (MCPA restricted use)	DUPLOSAN SUPER
Metolachlor + Atrazine (atrazine restricted use)	PRIMAGRAM, PRIMEXTRA
Paraquat + Diuron (paraquat restricted use)	GRAMURON AZUL
RODENTICIDE	
Brodifacoum	KLERAT, KLERAT GR
AVICIDE	
Fenthion	QUELETOX
MOLLUSCICIDE	
Methiocarb	MESUROL SNAIL PELLETS

Footnote:

1. Some commercial products may have more than one formulation.
2. Deltamethrin has no registered uses in the U.S. However, a small number of import tolerances are associated with the pesticide under the U.S. Federal Food, Drug and Cosmetic Act.

Table 6. Comparative Table of U.S. EPA, Mozambican and WHO Pesticide Toxicity Categories[3].

Hazard Indicators	Toxicity Categories			
	I "DANGER"[1]	II "WARNING"	III "CAUTION"	IV "CAUTION"
Oral LD50 (mg/kg)	50 or less	50-500	500-5,000	>5,000
Inhalation LC50[2] (mg/l or PPM)	0.2 or less	0.2-2.0	2.0-20	>20
Dermal LD50 (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; iritation 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 hours
EPA Signal Word	"DANGER"	"WARNING"	"CAUTION"	"CAUTION"
Mozambican Signal Word[3]	"MUITO PERIGOSO"	"MUITO PERIGOSO"	"PERIGOSO"	"CUIDADO"
Mozambican Pesticide Class	I	I	II	III
WHO Hazard Class	Ia (Ib)	II	III	III
WHO Classification	EXTREMELY (HIGHLY) HAZARDOUS	MODERATELY HAZARDOUS	SLIGHTLY HAZARDOUS	SLIGHTLY HAZARDOUS

Footnotes:

1. A picture of a skull and crossbones and the word "POISON" appear on the labels of pesticides that are registered in U.S. EPA Category I.

2. LC50 = lethal concentration required to kill 50% of a test population; the appropriate term for concentration of pesticides in gases (e.g., fumigants) or bodies of water (toxicity to aquatic life).

3. The toxicity classification systems of the U.S. EPA, the Mozambican Pesticide Registration Section, and the international standard classification system of the WHO, are not quite equivalent. See Sect. 4.4.1.3.

5.2 Availability and Effectiveness of Other Pesticides or Nonchemical Control Methods

5.2.1 Other Pesticidal Approaches

Constructive modifications of pesticide use include: botanical insecticides, biorational pesticides, lower rates of synthetic pesticides, innovative methods for pesticide application, and pesticide rotation to prevent buildup of resistance.

Botanical insecticides are derived from natural plant materials. They have been used successfully for centuries in traditional farming systems, and they are increasingly important in modern agriculture. "Botanicals" can be concocted at village level from flowers, leaves, stems, roots, etc., or produced by industry from more refined extracts. As of mid-1993 in the U.S., the following natural botanical insecticides are registered by the EPA and most of them are on the market as commercial products: azadirachtin (the primary insecticidal ingredient from the neem tree), capsaicin (from hot chili peppers), garlic, sesame oil, rotenone, pyrethrum, ryania, and sabadilla (see Annexes D.3, D.4, and E.2). Their EPA registrations, derivation, EPA toxicity category and acute oral and dermal LD50 values are summarized in Table 7. Note that these are all of relatively low toxicity and thus worth considering for use in Mozambique (some are already being used by project PVOs).

Two nicotine-based commercial products were registered by EPA until recently, but these have been removed from the market. Nicotine has an acute oral LD50 value of 50 to 60 mg/kg and is in EPA toxicity class I. Two basic nicotine pesticide products have been marketed, the alkaloid and the sulfate. The former has contact and fumigant action. When alkaline water or soap solution is added to the sulfate (aqueous solution containing 40% nicotine equivalent) the alkaloid is released, thus the result is a much more toxic product than the sulfate alone. *PVOs should not continue to extend infusions of ground rope tobacco plus soap to smallholder farmers.*

Plant-derived pesticides not registered with the USEPA can not be extended to farmers or promoted commercially with USAID funds. Experimental use on less than 4.0 ha (10 acres) of an agricultural experiment station is permissible. In a recent article in "EXTRA" published by the Centro de Formaçao Agraria e de Desenvolvimento Rural (CFA), Segeren (1993) found that three plants of the Meliaceae family controlled the corn borer ("broca ponteada") reasonably well. An infusion of green leaves of "Margosa" (neem, or *Azadirachta indica*) sprayed four times at weekly intervals (at 7,14,21 and 28 days after emergence (dae)) provided the same maize yield as cypermethrin 20% EC, 0.5 ml/l applied twice at 14 and 28 dae. "Mafurra" (*Trichilia emetica*) and "seringa" (*Melia azedarach*), applied as ground fruit and leaf infusions, respectively, did not control the borer as well as "margosa", but maize yields were statistically the same for these two botanicals and more than double the yield of the untreated control plots. Segeren, in the same article, provided a list of plants of Mozambique that have insecticidal properties - 29 species representing 14 plant families.

Biorational pesticides include viruses, bacteria, fungi, and protozoa, and chemical analogs of naturally occurring biochemicals, such as avermectin. The best biorational pesticide for PVOs to consider now is a bacterium with excellent insecticidal properties, *Bacillus thuringiensis* (B.t.). It is not registered in Mozambique yet, and its registration should be sought. Numerous strains or varieties of B.t. have been identified, hence the many commercial products worldwide. All of the strains (products) listed in the most recent 1993 "Farm Chemicals Handbook" are in EPA toxicity category III, with signal word "CAUTION". B.t. is generally considered to be nontoxic and safe for the environment. Some strains are tolerance-exempt on all raw agricultural commodities when applied to growing crops preharvest or postharvest. B.t. is recommended for control of most lepidopterous larvae (caterpillars) such as corn borers, army worms, diamondback moth, imported cabbageworm, etc. It would be very useful for PVO agricultural programs.

Reduced application rates It is sometimes possible to use lower than recommended rates of pesticides and still attain satisfactory pest control. For example, lower rates of some herbicides followed by animal traction cultivation and/or hand weeding will control weeds adequately and may give the farmer more weed management and off-farm employment options. Obvious savings in pesticide cost, increased human safety, less harm to the environment, decreased destruction of beneficial control organisms, etc. may be realized from lowering pesticide application rates. PVOs may want to consider this in their applied research.

Innovative methods of pesticide application can be put to use. For example, Segeren and van den Oever (1993) developed an alternative method for application of pesticides to cope with the general lack of knapsack sprayers in one of their research areas. They applied a sand/pesticide mixture from an ordinary soft drink bottle with satisfactory results. PVOs should be innovative, but safe too, in applying pesticides. It is an important challenge to develop safe application methods that are within farmers' financial means as well as their technical capabilities.

Alternating use (rotation) of pesticides, when feasible, will delay the onset of pesticide resistance. Sometimes this is not practical because of the limited number of registered GUPs available. PVOs should continually search for new, safer and more appropriate pesticides, as well as for non-chemical control methods, for IPM research and demonstration.

Table 7. Characteristics of EPA-Registered Botanical Insecticides.

Insecticide name	Derivation	Registration	Toxicity Category	LD50 Oral/Dermal (mg/kg)
Azadirachtin	Azadirachta indica	'Align' on fruits/vegs roots, tubers; Margosan, & others on ornamentals	IV	>5000/>2000
Capsaicin	Capsicum frutescens	'Hot Sauce' animal repellant	III	- -
Garlic	Allium sativum	'Garlic Barrier' vegs, citrus	-	- -
Sesame oil	Sesamum indicum	'Sesamex' a pyrethrum synergist	III	2000-2270/-
Pyrethrum	Chrysanthemum cinerariaefolium	many products stored food grains, pets	III	1500/>1800
Ryania	Ryania speciosa	many products citrus thrips Eur. corn borer, codling moth	III	1200/-
Sabadilla	Schoenocaulon sp.	- -	III	- -
Rotenone	Derris, Tephrosia, Lonchocarpus	many products garden dusts, animal ticks	III I	132-1500/- EC formulation

Note: Hyphens indicate data are not available. The SEA team could find no toxicity data on garlic. The label of 'Garlic Barrier' insect repellent however, had the signal word "CAUTION" with the admonition to avoid contact with the eyes, and if in them to flush with plenty of water. The empty, thoroughly rinsed container can be disposed of in household trash.

5.2.2 Non-chemical Control Methods and Options

As described in 3.2.2.1 above, many project PVOs are employing and extending non-chemical or botanical pest control methods to the fullest extent possible with the knowledge and resources presently available to them. Interviews indicate that there has not been much exchange of technical ideas or details of experimental findings and field experience, either among PVOs or between PVOs and the DSV or other resource organizations. Reciprocal visits and workshops could facilitate the testing and dissemination of new and better pest control methods (see 5.3.2.1).

A general summary of alternative pest management methods that could be considered[7]:

For the control of insects, mites and other invertebrates:

Biological control: Conservation, augmentation, inoculation, and habitat manipulation with parasites, predators and pathogens.

Microbial bioinsecticides and Biorational pesticides: B.t., *Beauveria, Metarhizium, Entomophthora*, etc. (the latter three are fungi effective against various insects).

Botanical insecticides: neem, garlic, capsaicin, rotenone, pyrethrum, etc.

Plant resistance (from breeding programs).

Environmental manipulations: Plant spacing, intercropping, timing of planting and harvesting, crop rotation, water management, soil preparation, sanitation, trap crops, fertilizer/fertility management.

Physical and mechanical control: Screens, traps and baits, protective packaging, barriers, flaming and burning, hand picking, diatomaceous earth, hot water (e.g., dipping mangoes against fruit fly).

Attraction and repellency: Attractants, pheromones, repellents.

Genetic manipulation of pest populations: Lethal genes, male-producing genes.

Induced sexual sterility

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[7] Source: Modified from: President's Science Advisory Committee. 1965. Restoring the quality of our environment. The White House. U.S. Gov. Printing Office, Washington, D.C.

For the control of plant diseases:

Disease resistance in host plants:
Reduction of losses by manipulation of plants and pathogens.
Control of plant pathogens by biofungicides, antagonists, hyperparasites, and natural enemies: *Pseudomonas fluorescens* (against *Pythium* and *Rhizoctonia* spp.), etc.
Disease - and nematode - free seed and propagating material.
Crop rotation and soil and water management.
Vector control

Nematode attractants and repellents
Soil amendments favoring nematode and fungal antagonists (e.g., neem seed cake)

Sanitation
Destruction of inoculum in crop residue, etc.
Roguing
Intercropping
Destruction of alternative hosts
Control of weeds around field borders, etc.

For weed control:

Biological control
Insects and other herbivores
Diseases, e.g., mycoherbicides

Environmental manipulation
Choice of variety
Seedbed preparation
Method of seeding or planting
Seeding rates and row spacing
Fertilizer management
Cultivation
Irrigation and water management
Erosion control
Design of irrigation and drainage canals and ponds
Managed grazing
Sanitation
Flaming and burning
Solarization

Weed-free crop seed.
--Weed- and propagule-free soil in nursery containers.

Natural stimulants and repellents

Plant competition

Revegetation of weed- and brush-infested grazing lands

Breeding highly competitive forage species

Oversowing

Green manures and cover crops

Crop rotations

Weeder geese

Mycoherbicides

For vertebrate pest control:

Noise and physical repellents
Chemical repellents
Trapping and shooting
Behavior
Environmental manipulation
Exclusion
Visual repellents
- Bird-repelling kites, strips, balloons
Birth control hormone analogues

5.3 Extent to Which the Proposed Pesticide Use is Part of an Integrated Pest Management (IPM) Program

5.3.1 Implementation Guidelines

In order to preserve the present commitment of USAID and the Project PVOs to IPM as a component of appropriate, sustainable crop management, PVOs' work with pesticides should follow basic IPM principles: employing ecological (non-chemical) crop protection methods as far as possible, and minimizing chemical inputs by using them only if economically justified, and only on an "as-needed" basis. The following technical and economic guidelines apply:

-- Through annual national-level workshops, international workshops, and ongoing contacts with regional and international centers of IPM expertise, Project PVOs

should constantly seek to identify non-chemical pest control measures suitable for adaptive research as potential components of IPM systems for their project crops.

-- PVOs' adaptive research on-station and in farmers' fields should continue to address non-chemical pest control measures for a given IPM system until promising candidate measures have been exhausted. (According to DANIDA crop protection experts, this sort of local adaptive research has been the missing key element for IPM development in Mozambique).

-- Safe and appropriate use of "least-toxic" pesticides as a last resort in an IPM system should be addressed in adaptive research when all candidate non-chemical pest control methods have been shown inadequate for providing satisfactory pest control. Among relevant pesticide-related topics would be: their cost/benefit ratio (deciding how severe a pest problem must be before pesticides are economically justified under local conditions); their relative impact on pests and beneficial insects/spiders in the field (Which ones interfere least with natural pest control?); and practical, safe and inexpensive application methods relying on readily available local materials. Pesticide efficacy testing is not a priority research focus, that being largely the responsibility of the private sector and the only pest control approach for which field research is already well-financed and generally adequate. However, testing to determine the lowest effective rate of a promising pesticide may be justified.

-- In order to safeguard applicators and minimize nontarget effects, PVO work should concentrate on the least-toxic, most pest-specific pesticides.

-- No pesticide use should be recommended to farmers until field trials have shown that non-chemical pest control methods do not provide satisfactory control, and that the pesticide recommendation is economic under local conditions.

-- No insecticide use should be recommended on a preventive or "calendar application" basis; PVOs should teach farmers how to use non-chemical pest control methods routinely to prevent pest infestations as far as possible, to check their fields regularly for problems, and to apply insecticide only when pests far outnumber their natural enemies and reach a level of infestation (the "economic threshold" or "action threshold") that has been shown to economically justify application.

-- In order to ensure that pesticide use is sustainable and that farmers develop habits and attitudes that take the real economic costs of pesticide application into account, PVOs are not to provide free pesticides to farmers, or any form of pesticide or application subsidy, except for farmer's field adaptive research, for very limited extension demonstration purposes, and under emergency circumstances (see 4.1.4). In all other cases, when farmers wish to use pesticides they should be required to purchase them from commercial suppliers and pay full market price.

5.3.2 Opportunities to Strengthen the IPM Orientation of PVO Field Activities

5.3.2.1 Better Collaboration and Technical Support

Project PVOs have been experimenting with non-chemical pest control measures, but have not had access to all the ideas and information that are applicable and available in Mozambique. Field interviews revealed that communication among the project PVOs regarding pest management research and extension is almost non-existant. All of the PVOs found government technical resources lacking at district and provincial levels, and few have ever approached the DSV in Maputo for the excellent information and publications that have been available there. Communication between PVOs and regional and international organizations listed in 4.3.2 that are interested in pest and pesticide management are *ad hoc* and inadequate also. There is clearly a need to provide project PVOs with good-quality training and technical backstopping in IPM and to enable them to make better progress by learning from each other.

This technical support requirement could be met by convening an annual national IPM workshop organized by USAID with technical input/guidance from DSV/DANIDA and other in-country experts. Objectives would be (a) to facilitate better communication and collaboration among the various PVOs, and between them and their government counterparts, regarding policy, technical information, and cooperative research and training, and (b) to provide an opportunity for upgrading the knowledge and skills of PVO staff. If circumstances permit, selected expert participants could be invited from foreign countries to contribute current information on topics of overriding common interest. All interested in-country PVOs should be invited, as well as representatives from the numerous Mozambican organizations whose programs involve IPM (see 4.3.1).

Such a workshop would function as a training opportunity for PVOs and their government counterparts. It would be particularly important for enabling PVOs to do a comprehensive job of testing and extending non-chemical pest control methods and strengthening extension and INIA programs at the local level. This is consistent with USAID's expectation that PVOs will develop a collaborative working relationship with specific ministries in their field of work, and provide assistance to GRM district and provincial level officers. USAID has also asked PVOs to coordinate with other PVOs working in the same area, and they are encouraged to develop networks with other organizations (USAID/Mozambique 1993a). All PVO staff interviewed expressed lively interest in participating in workshops of this description.

There is also place for an international IPM workshop (or a series of regional workshops) for PVOs/NGOs working in Africa, organized by the USAID Africa Bureau in collaboration with international PVOs that have showed outstanding interest in IPM, such as CARE, OXFAM and Rodale International. At this higher-level workshop, the objectives would be: working for adoption of IPM as the official crop protection policy of governments and for other policy changes that improve the climate for IPM implementation; the

formulation and ratification of PVO IPM guidelines for field activities; collaboration/networking for information, training and research; and the establishment of linkages to regional and international sources of IPM expertise and information.

5.3.2.2 Farmer Mobilization

Leadership and mobilization skills exist among many or most local communities as a result of FRELIMO activities in the pre- and post-independence period. Urban centers, periurban areas and towns tend to be organized, down to groups or cells of a small number of households. This form of organization is much less evident in rural areas, but through the political party, villages tend to be organized with committees, and sometimes subcommittees (USAID/Mozambique 1993a). These skills and the wealth of community organizing experience should be tapped for implementing IPM measures that are most effective when applied community-wide (e.g. rat baiting) and for extension programs and communication campaigns.

5.4 Proposed Methods of Pesticide Application and Availability of Application and Safety Equipment[8]

Conventional pesticide application equipment will be too expensive for PVO Support Project farmers in the near future--even simple backpack and garden-type compression sprayers. Small, squeeze-bottle hand sprayers can be purchased locally for about US$2.00, but even that would be too costly at present for most smallholder farmers. For the time being, the "deslocados" are limited to hand application of natural products such as wood ashes or lime, and ground hot pepper and garlic. Infusions are sprinkled on with a hand broom or sprig of leaves, whereas the others are sprinkled by hand. A piece of plastic or a similar barrier is used to protect the hand from the hot pepper.

In the future however, as synthetic pesticides begin to reach smallholder farms in greater amounts (because there is a demand for them to protect high-value vegetables, for example), all sorts of "arrangements" will be made to gain access to small sprayers. Some farmers will acquire small sprayers collectively by pooling their money and sharing a sprayer. Others will be able to purchase their own equipment, and some will rent it out or develop a part-time small business by spraying for others.

Some PVOs are already using backpack and compression sprayers and squeeze bottles, as well as applying granules and baits by hand. One PVO has provided an acaricide (aerosol cans) to smallholder farmers for tick control on draft animals. In the near future PVOs will probably be using more types of pesticide application equipment, depending on: the policy of their organization; the crop, area or volume (stored grains) to be treated; type of pesticide; and environmental conditions in the spraying area. Additional application equipment, beyond backpack and compression sprayers, might include: hand-held and

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[8] For guidance on safe and appropriate pesticide use, refer to Ciba-Geigy 1988, GIFAP 1985-89, Overholt and Castleton 1989, and USAID 1991, 1993.

knapsack dusters, soil injectors, hand-held ULV (ultra-low volume) electrostatic sprayers, hand-held spray guns attached by long hoses to transportable pumps, and possibly motorized knapsack sprayers. Most of these, as well as conventional backpack and compression sprayers, can be found in Maputo, or should be available in neighboring South Africa, Zimbabwe or Swaziland.

At a small agricultural products store in Beira there were two high-quality backpack sprayers for sale, one from England and the other from Brazil. Each cost M$ (meticais) 550,000 or the equivalent of U.S.$117.02, at the exchange rate then (about the same as those sprayers would cost in the U.S.). Pesticide application equipment is thus available, albeit expensive. An encouraging array of pesticide safety equipment was on sale in the same store, including several types of respirators, masks and gloves.

When PVOs or those assisted by PVOs purchase new application or safety equipment, they should insist on receiving an owner's manual, spare parts list with diagrams, and repair kit--if indeed any of these come with the unit. If available, these should be kept handy to ensure proper operation, and timely replacement and maintenance. Whenever possible, the PVOs should keep copies of manuals and a stock of spare parts at the site(s) where pesticides are to be used, to avoid costly down time.

The PVO Support Project must require that adequate personal protective equipment (PPE) be used in all pesticide-related PVO activities. To "use" pesticides means to purchase, transport, store, measure/mix/load, apply, and dispose of pesticides and containers, as well as clean application equipment. As far as USAID is concerned, "use" of pesticides includes even the provision of fuel for pesticide transport and application vehicles. The project also must require PVOs to adhere to safety standards which will avoid, or reduce to a minimum, environmental or human health hazards during each pesticide use. Approved PVO contract or grant budgets must allocate funds for protective gear if any pesticide use is proposed. PVO technical personnel must be adequately trained to ensure that pesticides are used safely.

The pesticide label should indicate clearly which types of safety gear or clothing should be worn for each specific use of that product. Even more important, the gear must fit correctly. For example, the best canister made is useless if the nosepiece is not flexible enough to permit a tight seal over the nose. Even correct and well-fitting safety equipment will be very uncomfortable in Mozambique's oppressive heat and humidity. PVO staff can advise applicators to spray during the early morning or late afternoon, or during cooler overcast weather. Also, there are certain times when it is more safe NOT to use PPE. In Mozambique's very hot and humid climate, the use of respirators is very uncomfortable because of sweat that rapidly accumulates inside of the face piece. That can cause the user to move the respirator up and down, but often with pesticide-contaminated gloves that then contaminate the skin. Therefore, a respirator should only be worn if the label states that it should (assuming that the pesticide is correctly labeled). Another setting in which a respirator is not needed is when handling pesticides in the open air. If there is plenty of fresh air flow, the respirator would be more of a hindrance than a help. Of course, there are situations in which respirators must be worn, such as in enclosed spaces when working with dusts,

aerosols and irritating sprays. *Reading and heeding the label instructions, and using common sense, should allow for safe and effective pesticide use.*

5.5 Acute and Long-term Toxicological Hazards Associated with the Proposed Pesticide Use and Measures Available to Minimize and Mitigate Them

All agrochemicals, including pesticides, are toxic to humans and other organisms to some degree, so therefore must be treated with caution. Even some pesticides that are of comparatively low toxicity can be extremely hazardous to users if risk of bodily exposure is high. Toxicity is how poisonous a chemical is (an inherent characteristic); hazard is a function of toxicity and degree of exposure to the chemical. A pesticide is not hazardous, but its use may be.

The "inert ingredients" in pesticide formulations also present a possible hazard. They do not need to be identified by the manufacturer, and are not subject to safety regulation. Pesticide "inert ingredients" should never be assumed inert.

The relative toxicity of a pesticide can be judged from its acute LD(lethal dose)50 value, which is a statistical estimate of the amount of the pesticide required to kill 50% of the population of test animals in question. The LD50 is expressed in milligrams (mg) of pesticide chemical per kilogram (kg) of body weight of the animal, when swallowed (the oral LD50) or absorbed through the skin (dermal LD50). Rats and rabbits, respectively, are generally used for these tests. The pesticide is administered once to the laboratory animal for a rapid, acute effect, hence the term "acute LD50". A severe poisoning from such a single exposure causes acute toxicity. The term LC(lethal concentration)50 is used to describe toxicity from inhalation, or toxicity to fish in water, and is expressed in mg per liter or parts per million.

The lower the LD50 value, the more toxic the pesticide is to humans and other animals. Ingestion of only a few drops to a teaspoon (5 ml) of a pesticide with an oral LD50 value of less than 50 might be enough to kill an adult, whereas 1 pound (454 grams) might be necessary to kill the same person who ingests a pesticide with an oral LD50 of 5000 or greater. However, the pesticide's formulation, percentage of active ingredient, and application method determine how hazardous it is to use. Rodenticides, for example, usually have low acute oral LD50 values, but are considered only moderately hazardous to persons because their pellet formulations are only about 2% active.

Table 6 presents various criteria that the U.S. EPA has used to establish pesticide toxicity categories. Under each category (I through IV) is the EPA signal word that appears on the label of each pesticide registered by the EPA. Pesticides with the signal word "DANGER" are highly toxic and are not recommended by the EPA for general use. Pesticides with labels bearing "POISON" or "WARNING" are less toxic but still indicate high potential hazard to the user. Labels with the signal word "CAUTION" indicate that the pesticide product is the least toxic and presents the least hazard when used according to label instructions.

The relative toxicities of pesticides and the hazards associated with their use are best judged by examining the label for the EPA signal word and toxicity category. If available, the acute oral and dermal LD50 values are also very useful.

5.5.1 Pesticide Residues

Another environmental consideration for the PVO Support Project, as its PVOs expand into new agricultural lands, is the presence of residues from previous pesticide use. Some organochlorines can persist for as many as 20 years or more in the soil. Knowledgeable persons such as Marina Pancas and Jose Dulamo (DSV), Vlassios Pantazis (Agroquimicos), Fernando Carvalheira (Ciba-Geigy), Drs. Rufino Melo and Evaristo Baquete (MOH Dept. of Environmental Hygiene), Bernardo Ferraz (CNA) and Dr. Almeida Franco (MOH Malaria Control Section), could inform the project where such persistent pesticides might have been stored or spilled in past years.

5.5.2 Hazards to Humans

Some pesticides, even of low toxicity, present serious exposure problems such as acute inhalation toxicity, serious eye or skin irritation, or easy skin penetration because of "inert ingredients" that contain dangerous organic solvents.

Pesticides enter the body by ingestion (oral route), by passing through the skin (dermal entry), and by being inhaled. Once in the body, the pesticide passes through the bloodstream to the site(s) of action, and poisoning or death results. As a general rule, dry formulations such as pellets, granules, wettable powders, soluble powders and water-dispersable granules are much safer to handle and apply than liquid formulations such as emulsifiable concentrates, ultra-low volume (ULV) concentrates, and solutions. Emulsifiable concentrates are easily absorbed through the skin because of the solvents they contain. Dust from wettable powders, water-soluble powders, and dust formulations can be readily inhaled.

In general, insecticides and acaricides are much more toxic to humans and more hazardous to use (often in toxicity categories I and II), whereas fungicides and herbicides are usually the least toxic and least hazardous (mostly in categories III and IV). Exceptions are the fungicide carboxin and the herbicide oxadiazon that are in categories I, II and III, and I and II, respectively, because of different formulations.

Organophosphates result in acute toxic reactions, but recovery is normally rapid once the person affected has been removed from exposure. Usually there are no obvious after-effects if new exposure is avoided. The subacute, long-term effects of chronic exposure are not well known, but some nervous system damage appears likely.

Carbamates generally present less serious problems to pesticide applicators than organophosphates do. Both groups, however, may lower the cholinesterase level to a point at which renewed exposure could trigger acute poisoning. Treatment of symptoms for both groups is possible with atropine. The antidote 2-PAM is also indicated for organophosphates,

but NOT for carbamates. Organophosphates and carbamates are not stored in body fat and are readily excreted in urine.

Organochlorines (also called chlorinated hydrocarbons) commonly have a high oral toxicity and long residual action. Residues accumulate readily in body fat so that even low exposures over time can lead to serious buildup or bioaccumulation. When released during fat breakdown, especially if the person loses weight rapidly, these compounds can be a serious source of poisoning. Organochlorines destablize the central nervous system. Antidotes cannot remedy organochlorine intoxication. These compounds are also carcinogenic, so risk of exposure should be minimized. The insecticide endosulfan, used for a number of years in Mozambique, is now restricted in the U.S. and listed as a Class I pesticide (i.e., HIGHLY TOXIC) in Mozambique. Fortunately, endosulfan is the only organochlorine insecticide (among 35 insecticides or combinations) currently registered in Mozambique.

Most pesticides in the other categories are not nearly as persistent or toxic to humans as those in the three groups just mentioned. Nevertheless common-sense precautions should be taken when using every pesticide. Again, the pesticide label is the first source of information for use precautions.

5.5.3 Possible Adverse Effects on the Environment

Use of the proposed GUPs in PVO activities (according to instructions on the pesticide label, and assuming properly trained applicators) should cause no harmful effects to the environment. Nevertheless, pesticides might be misused unintentionally by PVO personnel, or PVOs might observe incorrect use by others. Therefore, knowledge of some possible harmful effects on the environment is useful.

Many insecticides are very toxic to bees and other pollinators. If application can not be avoided during the flowering period of sprayed plants, then it should be done early in the morning, late in the afternoon, or during cool conditions, when bees are not as active (less than 19 degrees C or 65 F). The relative toxicities to bees of some pesticides available in Mozambique are:

-- Highly toxic: carbofuran, diazinon, dimethoate, fenitrothion and malathion;
-- Moderately toxic: methomyl;
-- Slightly toxic: endosulfan and trichlorfon.

Other pesticides available in Mozambique that are toxic to bees include the following (the degree of toxicity is not known): azinphos-methyl, carbaryl, cypermethrin, deltamethrin, oxadiazon, phosphamidon and pirimiphos-methyl.

Predators and parasites of insect pests are another category of useful arthropod that pesticides can harm, leading to a breakdown in natural pest control This natural pest control is the backbone of pest management, and IPM seeks to enhance biological controls by minimizing pesticide use and preferring highly specific and environmentally benign pesticides

such as B.t., which kills only certain pests (e.g. caterpillars, mosquitoes, etc. according to the strain of B.t.).

Pesticides available in Mozambique that are considered toxic to fish are chlorothalonil, deltamethrin, DDT, diazinon, endosulfan, malathion, acetochlor, oxadiazon, pendimethalin, phosphamidon, pirimiphos-methyl, propargite and thiophanate-methyl (catfish). Spray drift over bodies of water and washing sprayers and discarding empty pesticide containers in streams can cause fish kills.

Four pesticides are toxic to birds: carbofuran, chlorpyrifos, endosulfan and phosphamidon. Carbaryl is toxic to animals that eat fish, whereas phosphamidon is considered toxic to wildlife in general. Carbofuran granules kill many birds, probably because the granules resemble grain, and they are disallowed for PVO Support Project use for that reason.

5.5.4 Measures Available to Minimize and Mitigate Hazards

Section 6.0 provides a complete list of the mitigative measures and recommendations specified in this SEA.

5.5.4.1 Sound Practices and Safety Precautions

Whenever possible, PVOs will select both the least toxic pesticides and the least toxic formulations of those pesticides. The proposed GUPs (Tables 1-4) are considered safe to use by an applicator who has received sufficient training and who also follows the use instructions provided on the pesticide label (that includes advice on using the proper protective equipment and clothing).

The greatest exposure during pesticide use is usually experienced by those who measure, mix, load, apply, and clean equipment, and enter a treated area without protective gear. Precautions will be taken at all times during these operations. Users will be trained what to do in cases of emergency situations such as poisonings, pesticide spills, leakage or sudden spray from faulty equipment (such as when a hose or coupling fails, etc.).

Long-term effects of human exposure to pesticides are largely unknown. The pesticide applicator therefore, must always be conscious of and attentive to prevention of bodily contamination. Testing of blood cholinesterase levels should be done for any PVO staff who will be applying these types of pesticides regularly, and on a long-term basis (probably not likely in the near future). Such testing will establish the individual's cholinesterase level before the spraying season. Subsequent periodic testing will determine if the level is decreasing dangerously. The "normal" level does vary greatly among individuals, so both "pre-exposure" and "during-exposure" readings are necessary. Cholinesterase screening may be available through the Ministry of Health Toxicology Unit or the Laboratorio Nacional de Higiene de Agua e Alimentos (LNHAA)(see Annex F.2).

5.5.4.2 Environmental Monitoring

Least-toxic pest management practices combined with training in the safe and proper use of pesticides will be the major approach to environmental safety in the PVO Support Project. Environmental precautions stipulated on pesticide labels will be observed and the GUPs proposed for project use are mostly non-persistent and should not cause long-lasting harm to the environment. Nevertheless, the project should take reasonable steps to check that these preventive measures are working.

This SEA endorses the recommendation of the Environmental Impact Review of the Mozambique Private Sector Support Program/Project (Loken 1993) that USAID support, and use information generated by, GRM and donor agency environmental monitoring programs (including wildlife and water quality), and that *this formal sectoral information-gathering should be supplemented by NGOs on the local level, as part of their normal project implementation and impact monitoring activities.* Sampling design, instructions, specialized training and, hopefully, materials whould be provided by the agencies responsible.

Those likely to be responsible for environmental monitoring in Mozambique include the National Environmental Commission (CNA), LNHAA, and the proposed UEM/Lamar University environmental monitoring research and training project (see 5.7.2 and Annex F.3). There appears to be scope for these parties to cooperate among themselves in order to better utilize scarce resources. For example, the CNA and UEM/Lamar are already in contact and planning to collaborate. The LNHAA and UEM/Lamar should also explore possibilities for collaboration. Their actual and proposed water collection sites appear to have the potential for complementarity. LNHAA already has years of experience that EMU/Lamar could benefit by.

USAID/Mozambique should seek ways to support these pesticide monitoring efforts. The proposed UEM/Lamar University project is one possibility. Dr. Baquete of the LNHAA mentioned that in addition to more trained personnel, they need laboratory supplies such as additional chemical reagents and glassware. Belayneh (1993) reports that the LNHAA needs equipment as well: "The Plant Protection Service (DSV/DANIDA) does not have either the technical capability or the required equipment to conduct residue analysis for environmental monitoring or for (pesticide) quality control. It is true that the National Laboratory of Hygiene of Water and Food of the Ministry of Health possesses a gas chromatograph, but due to heavy use that laboratory often can not undertake additional work." Relevant contacts include Drs. Evaristo Baquete and Rufino Melo of the LNHAA, Mr. F. Mabjaia and Dr. M. Whiteside of U.N. Environment Programme (CNA), Drs. I. Rafael Manuel and U. Aswathanarayana at UEM, and J. Dulamo and L. Kjaer of PRS/DSV/DANIDA.

5.6 Compatibility of the Proposed Pesticides with Target and Nontarget Ecosystems

Although Mozambique has a great diversity of flora and fauna, adverse impacts on the environment are not likely to be caused by use of pesticides by PVOs in their agricultural

development programs. That is because pest management by PVO personnel will be conducted according to IPM principles and coupled with sound training (See 5.7.1) and monitoring (see 5.5.4.2 and 5.8).

No pesticide use will be recommended to smallholder farmers until non-chemical pest controls have been tested and found unsatisfactory.

Protected and sensitive habitats (e.g. bodies of water with vulnerable aquatic life) within or closely bordering crop and livestock production areas may be at risk from pesticide use (see 3.1.3). When pesticides are used by PVO field staff, great care will be taken to avoid pesticide drift and possible groundwater and surface water contamination. Proper procedures for disposal of unused and obsolete pesticides, and empty pesticide containers will be followed. Pesticides will not be applied in forests and wildlife zones, and so biodiversity should not be affected. PVOs should familiarize themselves with the location of these areas, and observe no-spray buffer zones within 50 m (calm conditions when no drift can occur) to 500 m (breezy conditions, possible pesticide drift) of the protected area. Information on protected sites can be obtained from UNDP/FAO, Forestry/Wildlands Sector in Maputo.

5.7 Provisions for Training

Training is perhaps the most important activity of PVOs involved in agricultural development, and effective training is the best way to minimize and mitigate potential hazards of pesticide use. In view of the extensive training needs outlined below, and of the disparate educational, cultural and occupational characteristics of the training audience, it would be advisable for the PVO Support Project to employ a training specialist consultant. This person should work with project and HRDA staff within USAID/Mozambique to design a comprehensive training program that draws on a diversity of in-country expertise and applies participatory non-formal education techniques that have been proven effective in developing country settings. See sections 4.4.4.1 and 4.3.1.1 for discussion of existing training and extension programs and facilities.

5.7.1 Project Staff and Beneficiaries Who Will Use Pesticides

5.7.1.1 Training Needs

To be prepared for a likely expansion in pesticide use, the PVOs now have the responsibility -- and mandate -- to train all users of pesticides in their programs, including agronomists, extensionists, field workers and farmer beneficiaries. Pesticides are already being used to a limited extent by some PVOs for internal project purposes, such as protecting research and demonstration plots and seed/cuttings multiplication fields from pest attack. PVOs may use more pesticides as they expand research activities into irrigated vegetables. Some pesticides are already being recommended to smallholder farmers by provincial agricultural officers. Many of those farmers have no training in their safe and correct use. As the peace continues, and as development occurs rapidly in the agricultural sector, the use of pesticides by smallholders will probably increase rapidly.

Informal training can occur during day-to-day activities as the opportunity arises. One very effective type of informal training in Brazil, called the "estagio" or "on-the-job-training", places the trainee in the field with experienced agronomists or extensionists for a time (anywhere from a week to several months). The "estagiario" (person undergoing the short-term training, perhaps a PVO district extensionist or selected farmer leader) thus learns on the job while working--the best way to learn. PVOs should be alert to such excellent informal training possibilities.

PVO agronomists/supervisors and experienced extensionists are usually cognizant of basic IPM concepts and the hazards associated with pesticides. Even so, all PVO agronomists/supervisors and extensionists should be encouraged to attend IPM and pesticide management courses as soon as these can be arranged. Any PVO staff who are to apply RUPs must be qualified to do so by passing an intensive pesticide applicator training course, with periodic refresher training and re-testing (see 5.1.3).

Outside consultants plus Mozambican experts could help design and conduct these initial courses with the MOA-DSV and DANIDA. Each course might accomodate up to 28 persons (considered an optimum workshop number). Annex G.1 provides illustrative outlines and budgets that may be of assistance for course planning. The budgets were prepared with the assistance of Scott Hudson, ATLAS and HRDA Project Manager of USAID/Mozambique.

Yearly refresher courses for PVO agronomists and extensionists should also be planned. These courses of one or two days can include topics such as the latest findings from others' IPM research and extension in Mozambique (from DSV/DANIDA, INIA, etc.) and other parts of southern Africa; research and extension news from the other PVOs; observations of irresponsible pesticide use by farmers and PVO personnel; latest developments in pesticide registration from the PRS/DSV/DANIDA; reports from medical or health unit personnel concerning pesticide poisonings or spills; product information from selected pesticide distributors; etc. The annual IPM workshops proposed in 5.3.2.1 would provide an excellent opportunity for this upgrading of skills and knowledge.

All other PVO field staff who work with pesticides should be required to attend 1- or 2-day courses on IPM and pesticide management. These shorter sessions can be taught by agronomists and extensionists who have successfully completed the longer, intensive courses. Farmers and others needing a less extensive IPM and pesticide management background can also attend these shorter sessions.

To prevent duplication of effort and the wastage of valuable resources, IPM and pesticide safety and management training courses should be planned in consultation with, and, where appropriate, presented collaboratively with, other projects and agencies with similar training needs. Likely collaborators include USAID/Mozambique, other PVOs/NGOs, PRS/DSV/DANIDA, INIA, CFA and other sections of the MCA, MOH, CNA, World Bank, UNDP, and Eduardo Mondlane University.

5.7.1.2 Equity, Language and Literacy

Equity. Extension, training and information dissemination activities for project beneficiaries should include women, children, the displaced, landless laborers, etc., i.e., everyone involved in crop production/protection--as appropriate for their role in relation to IPM practices. Specific attention will have to be paid to this aspect of project activities because customary practices and local institutions (such as government extension services) and their routine operations are typically *not* inclusive. According to USAID/Mozambique (1993a), "there is evidence from some areas within Mozambique that the displaced are given lower priority for local facilities and services than the local inhabitants", and there "...seems to be a tendency for male decision makers at various levels to assign anything which aims at women to the "responsibility" of the Organization of Mozambican Women (OMM) rather than seeing that women are integrated into all activities, particularly economic pursuits...in some areas women do not speak up and voice their opinions in front of men, therefore joint meetings are not appropriate. Consultations with groups of women separate from those held with men are likely to yield better and more reliable information."

Women are receptive and high-priority beneficiaries for PVO activities. Among the characteristics of the population groups affected by the insurgency is a high proportion of female-headed households, often with a shortage of labor or skills. In some respects, womens' present community role and networks qualify them highly for inclusion in extension programs: northern Mozambique is inhabited by ethnic groups which are matrilineal and matrifocal, and the OMM has branches in provinces, districts, and many local communities. Experience with cooperatives in the Green Zones near Maputo demonstrate that it is reasonable and feasible to expect that women be equal participants and beneficiaries of those activities which promote food or cash crop production (USAID/Mozambique 1993a).

Equality for women has been a watchword of FRELIMO and hence GRM policy is compatible with USAID's emphasis on the inclusion of women and other frequently under-represented groups as participants and beneficiaries of projects. According to USAID/Mozambique (1993a), PVOs will be expected to undertake a baseline survey of the communities with which they will be working in order to obtain a better understanding of the composition of the target population and the problems and constraints which will affect implementation of the proposed activity. Those responsible for recruitment and employment are instructed to take active measures to inform the men and women in the community that women will be employed, such as involving the OMM in communicating this information. If the recruitment process does not publicly convey that women will be employed, then in some areas the community might assume that only men need apply. Monitoring and evaluation data should include feedback from all target groups and should be gender disaggregated.

Language and Literacy. Formal and informal integrated pest management (IPM) and pesticide management training should be presented in a range of languages, style and content designed to respond to the diversity of prospective trainees. Only a very small portion of the targeted smallholder population speaks Portuguese, and only a small percentage of Mozambicans are literate. The language problem this poses for trainers should be made less

difficult by the GRM policy of resettling displaced people in groups from the same or neighboring geographic areas, in order to facilitate the re-establishment of former support networks and community identity (USAID/Mozambique 1993a).

5.7.2 Complementary Training for GOM Counterparts in Agriculture and Environmental Protection

In order to help PVO personnel and their provincial and district plant protection counterparts grasp IPM principles more readily, a selected group of trainees could be sent for a short (two weeks-one month) hands-on field course to a Portuguese-speaking country with functioning IPM programs, perhaps Brazil or Cape Verde. The training specialist consultant could explore that possibility.

PRS/DSV needs an M.S. scholarship in crop protection (specialty in pesticides) for their Pesticide Registrar, who is now pursuing his B.S. in Newcastle. USAID should consider him as a recipient for long-term training.

Further long-term training to consider is the possibility of training Mozambican environmental monitors in a proposed cooperative program between Eduardo Mondlane University of Maputo and Lamar University of Beaumont, Texas entitled "Formulation of Environmental Monitoring Systems Towards Sustainable Development of A Low-Income Developing Country: A Pilot Project for Mozambique" (see Annex F.3). The proposed project would address three principal areas: 1) analysis of nutrient elements, toxic heavy elements, agrochemicals and othe human pollutants in Mozambican soils, waters, foodstuffs, etc.; 2) field and laboratory training of UEM personnel at Lamar, with trainees later forming the nucleus of an environmental monitoring group in Mozambique that could formulate policy on sound natural resources management; and 3) assistance in building national laboratory facilities at UEM that may evolve into a self-supporting Environmental Research Center serving SADCC countries.

UEM has approached USAID/Mozambique and other donor agencies for review of the proposal. While in Mozambique, the SEA team suggested that UEM also contact the National Environment Commission (CNA). UEM later responded to the team by fax indicating that, "most likely, Mr. Mabjaia of the CNA may himself be able to participate in the project." At this writing, the project document may have already been presented by the National Executive Agency to USAID in Maputo.

5.7.3 Complementary Training for GOM Public Health Personnel

The SEA of locust/grasshopper pesticide use in Mozambique (Belayneh 1993) noted that "there is no single toxicology or related unit in the hospitals in Maputo that is well equipped to address pesticide poisoning...doctors and nurses are not trained to recognize pesticide poisoning or to use drugs or other necessary treatment." A special course on the diagnosis and treatment of pesticide poisoning should be designed for health unit personnel. Follow-up sessions could be scheduled which would assure that medical and health unit

personnel stay aware of the impact of pesticides on the agricultural community and the general population. Training of MOH officers involved in cholinesterase screening of pesticide applicators should also be investigated. The contact persons for such screenings are Drs. Rufino Melo and Chirindzi of the Departamento de Higiene Ambiental of the MOH.

5.8 Provisions for Monitoring the Use and Effectiveness of the Pesticides

PVO and USAID/Mozambique staff are, of course, responsible for ongoing monitoring and evaluation of PVO Support Project activities. However, because of the special health and environmental hazards posed by pesticides and because pesticide misuse is endemic in developing countries, specific, ongoing responsibility must be assigned to an outside party for providing appropriate technical guidance and for making sure that the mitigative measures proposed in this SEA are implemented on the long term and that SEA recommendations are followed up. These advising/monitoring duties (outlined in Annex G.2, an illustrative Scope of Work for a consultant Pesticide Advisor/Monitor) may be assigned to one or more people at the discretion of the USAID Africa Bureau and USAID/Mozambique. There are many possibilities, including the Africa Bureau Environmental Advisor, Regional Pesticide Advisors, outside consultants, etc.

Someone, perhaps a consultant Advisor/Monitor, will visit PVO field programs periodically in order to advise agronomists, extensionists, cooperating farmers, field workers, etc. on IPM and safe and effective pesticide use and (through unannounced field visits) to monitor for proper pesticide use and handling. Pesticide "use" will mean safe and rational transport, storage, measuring/mixing/loading, application and disposal of pesticides and containers. Use monitoring will involve checking on any use of RUPs or products not registered and purchased in Mozambique, application decision making and frequency, application sites, efficacy, use of safety precautions and proper protective clothing and equipment, etc. The Advisor/Monitor should be present during actual use of pesticides in order to observe first-hand and to offer assistance to PVO field staff.

6.0 SYNOPSIS OF SEA CONSIDERATIONS, WITH MITIGATIVE MEASURES, AND RECOMMENDATIONS

6.1 Alternative Strategies for USAID Support

"No action" is the option in which USAID support would be witheld from PVO activities which involve pesticide use. A rationale in support of that alternative is presented in section 6.1.1 and then constrasted in section 6.1.2 with another, recommended approach.

6.1.1 The "No Action" Alternative

At the moment, commercial pesticides are not available or not affordable for most small-scale farmers in Mozambique. Although some of them know of pesticides and are favorably inclined toward using them, few rural people have done so as yet. Particularly if pesticides are being recommended to farmers in the family sector, there are compelling arguments against encouraging increased pesticide use under current Mozambican conditions.

With regard to public health, Mozambican small-scale farmers are generally unfamiliar with pesticide-related risks. Government enforcement of pesticide registration and management regulations is currently almost nonexistent. "Medicamentos" or "drogas" that reach rural areas are usually unlabeled, often stored in dangerous containers (oil tins, beverage bottles, etc.), and are applied without protective clothing or other advisable safety precautions, posing a danger to applicators. Persistent compounds and wrong application practices may leave toxic chemical residues on produce. Government extension systems serving the family farm sector are generally nonfunctional. Not only do most rural people have no access to information or training that would equip them to use pesticides safely, but because war has destroyed the GRM's public health services, treatment and antidotes for pesticide poisoning will probably be unavailable for some time.

Pesticide misuse by farmers also endangers the environment. Persistent organochlorines such as DDT, which harm wildlife, were banned years ago for agricultural use (do Rosario 1991), but are still being sold. People who do not take appropriate precautions may pollute shallow wells and streams (through discarding pesticide containers, for example, or by applying chemicals close to wells where pesticide runoff or percolation will reach ground water), endangering the water supply. During field visits, the SEA team observed that farmers' wells are often very shallow. The team's visits were during the dry season; the water table is probably even higher during the rest of the year.

Risks aside, some analysts perceive pest problems to be relatively unimportant among farmers' production constraints, and consider the sustainability of pesticide use at this juncture to be dubious. This was the view reflected in the Socioeconomic Feasibility section of the PVO Support Project's Social Soundness Analysis (USAID/Mozambique 1993a). In the view of the writers of the latter analysis, improved agronomic practices would make the largest difference: "improvement in basic cultivation practices, such as more thorough weeding and land preparation, and intercropping, could significantly increase yields. This

latter low cost method is recommended by the Food Security Study Team and appears more appropriate to the socioeconomic and physical conditions within which this Project will be implemented. Interventions requiring dependency on periodic purchase of inputs may be considered problematic since sustainability would be questionable."

Finally, the misuse of pesticides can cause more pest problems than they solve. Unnecessary insecticide applications can cause resistance in target pests, requiring ever more frequent applications. Unneeded sprays can also interfere with natural pest control by doing most harm to spiders and predatory and parasitic insects that kill pests and keep pest numbers below harmful levels most of the time. When this happens, pest flareups recur and are worse, or previously innocuous species suddenly reach damaging numbers.

Under a "no action" scenario, PVOs would avoid contributing to increased pesticide use in the family farm sector by directing their programs at other production constraints and/or by warning people about pesticide-related risks and recommending and teaching alternative pest management methods. This would help protect public health and the environment. It would also help ensure that due advantage is taken of presently available non-chemical pest control methods, and that due attention is paid to developing additional ones that promise to reduce the need for pesticides over the long term. If adequate technical information and guidance is available, this approach could contribute to the development of safer and more sustainable pest management systems with wide national (and international) applicability.

6.1.2 Rationale for USAID Authorization of Pesticide Use Under the PVO Support Project

The "no action" scenario has important disadvantages. Agricultural activity is by and large the preferred coping strategy employed by displaced persons, and is essential if any transition towards self provisioning is to take place (USAID/Mozambique 1993a). Given that pesticide use should be safe and economic if used in compliance with the mitigative measures and recommendations herein, exclusion of pesticides from the arsenal of possible pest control tactics might unnnecessarily reduce the Project's ability to enhance its clients' productivity and standard of living.

Perhaps more important, by not addressing pesticide use, PVOs may *increase* pesticide-related risk to public health and the environment. Non-participation by Project-supported PVOs would be only a very small impediment to the general increase in pesticide use that can be expected if the peace holds. Dangerous insecticides are being misused even at present, albeit presumably still on a small scale. Now that Mozambique is allowing chemical companies to operate freely, and there is a sharp upswing in agricultural development efforts by the GRM and other organizations, a rapid increase in pesticide use by the family farm sector appears to be inevitable.

In the short term PVOs are responsible for all extension activities in many regions, so without their guidance there will be little likelihood of correct and effective applications and

almost no possibility of mitigating the attendant hazards. On the longer term, PVO extension activities are to serve as a model for government programs, and seconded government extension agents are receiving in-service training through their employment by PVOs. If those extension agents do not gain knowledge, skills and training experience with regard to safe and proper pesticide use within an IPM context, and to pesticide-related issues, health and environmental hazards and enforcement of regulations relating to pesticides, then they will not be prepared to discharge their rural development duties adequately. Indeed, if PVOs continue to be prohibited from involvement with pesticides, the growing incongruence of that stance in the larger agricultural development context might undermine their standing and credibility, both with farmers and at higher levels.

This SEA proposes that PVOs be allowed to include pesticides in their crop protection training and research programs such that pesticide-related hazards can be mitigated and economic advantages captured, but with stipulations that seek to retain the safety and technology development advantages of the "No Action" alternative. As described in 5.3 above, PVOs' present laudable emphasis on non-chemical pest control methods is to be continued and farmers will be trained to keep their pesticide use to a safe, "only-as-needed" minimum.

6.2 Summary of Mitigative Measures and Recommendations

6.2.1 Mitigative Measures and Recommendations Proposed by this SEA

Mitigative measures and recommendations are presented separately, each with a reference to its discussion in the text. Mitigative measures relate to pesticide use and are proposed in order to safeguard human health and the environment. Compliance is required from project PVOs using pesticides, and should be monitored continually (see 5.8). Recommendations are less binding and relate to a broader range of activities.

6.2.1.1 Mitigative Measures

1) PVO adaptive research and extension for coping with any given problem should be confined to non-chemical pest control measures until promising non-chemical measures are exhausted. Safe and appropriate use of least-toxic pesticides is permissible on an "as-needed" basis when non-chemical methods have proven inadequate for satisfactory pest control (5.3.1).

2) Insecticides should not be applied to crops on a preventive or calendar application basis, but rather only when field monitoring finds that pests and their natural enemies have reached relative numbers (the "economic threshold" or "action threshold") that have been demonstrated to justify pesticide application. Pesticides may be recommended to farmers only if field trials have shown the recommended use pattern to be economic under local conditions (5.3.1).

3) Project PVOs must choose pesticides in accordance with the guidelines given in 5.1, which reflect USAID's requirement that its projects use registered products that are considered relatively safe for human health and the environment if applied by properly trained and supervised people.

4) Least-toxic pesticides should be preferred. PVOs may use U.S. EPA Restricted Use Pesticides (RUPs) when alternatives are lacking, but RUPs (and other highly toxic compounds) must be applied only by, or under the direct supervision of, appropriately-trained and -equipped personnel and only for internal project purposes (seed multiplication, experimental plots, etc.) and during emergency pest control operations. RUPs and Mozambican Class I pesticides may not be recommended for farmer use (5.1, 5.1.3, 5.7.1.1).

5) Unregistered plant-derived pesticides may be tested on up to four ha of a PVO agricultural experiment station, but natural botanical pesticides not registered by the U.S. EPA can not be extended to farmers or promoted commercially with USAID funds. Nicotine-based products have been removed from the market in the U.S. and pesticide solutions made with ground tobacco should not be recommended to farmers by project PVOs (5.2.1).

6) PVOs must train all users of pesticides in their programs, including field laborers and farmer beneficiaries, in IPM, safe and effective pesticide use and proper pesticide management. Training courses should be targeted to the needs and characteristics of specific audiences and all members of the rural community who are involved in crop production or who encounter pesticides should be included in extension and training programs (5.7.1).

7) Any PVO personnel who are to apply RUPs must be qualified to do so by passing an intensive pesticide applicator training course, with periodic refresher training and re-testing (5.7.1.1).

8) Pesticides must be handled and applied with appropriate application and safety equipment that is in good repair. PVOs are required to adhere to safety standards and practices that will avoid or reduce environmental and human health hazards associated with pesticide use. These practices, including the use of appropriate clothing and protective measures for pesticide application, must be consistently demonstrated and recommended to farmers (5.4, 5.5.4.1).

9) PVOs should arrange to monitor the blood cholinesterase levels of project personnel who apply pesticides frequently on a long-term basis (5.5.4.1).

10) Farmers and project personnel must be taught what to do in pesticide emergencies such as poisonings and pesticide spills (5.5.4.1).

11) Project PVOs must not apply pesticides within 500 m (calm conditions, no drift) - 2 km (breezy conditions) of forested areas, bodies of water, or other sensitive habitats and legally protected wildlife zones, and this precaution should be recommended to farmers (5.6).

12) Except for very limited experimentation and demonstration purposes and emergency assistance, project PVOs may not provide free or subsidized pesticides or pesticide application to farmers (4.4.2, 5.3.1).

13) Project PVOs, with the assistance of USAID/Mozambique and the PRS/DSV/DANIDA, should ask pesticide companies to obtain Mozambican registration as soon as possible for acaricide(s) suitable for use by smallholder farmers under USAID regulations (4.1.3, 5.1.1).

14) Specific, ongoing responsibility must be assigned to qualified outside person(s) for providing technical guidance and for making sure that these mitigative measures are implemented by Project PVOs as quickly as possible and on the long term, and for helping the PVOs to do so. These advisor/monitor(s) should also see that the recommendations of this SEA are followed up in a timely manner. One option is for the project to hire a consultant Advisor/Monitor, preferably on a long-term basis, to visit Mozambique periodically (5.8, Annex G).

6.2.1.2 Recommendations

Pesticides:

1) USAID should study and monitor the procurement of agricultural inputs through both government and commercial sources in Mozambique, not only as an aid to sound agricultural development decision making but also to uncover any form of pesticide subsidy. Subsidies should be discouraged through USAID's policy dialogue programs (4.4.2).

2) Neither PVOs, the PVO Support Project nor USAID should support or assume responsibility in connection with the formation of rapid intervention teams or village brigades for emergency pesticide application. Instead, they should support and use the services of regional organizations created for that purpose (4.1.4).

3) Project PVOs, with the assistance of USAID/Mozambique and the PRS/DSV/DANIDA, should ask pesticide companies to register *Bacillus thuringiensis* (B.t.) and possibly other biorational pesticides in Mozambique as soon as possible (4.1.3, 5.2.1).

4) PVOs should maintain contact with the PRS/DSV/DANIDA to keep abreast of new pesticide registrations that may be useful, as well as cancellations of old registrations (4.4.1.2).

5) The Government of Mozambique should seek further technical assistance from FAO and other sources of expert advice for the creation, implementation and enforcement of pesticide regulations. Modes of regional cooperation should be explored (4.4.1.1).

6) In concert with other donors, USAID should consider giving technical and material assistance to the Government of Mozambique for developing its pesticide management and

monitoring capability and expanding and equipping the requisite pesticide quality control and residue analysis laboratories (5.5.4.2).

7) USAID/Mozambique should encourage the Malaria Control Section of the MOH to confer with experts and the PRS/DSV/DANIDA with a view to reserving certain suitable insecticides exclusively for present and future malaria mosquito control, thus lessening the chances of insecticide resistance developing in disease vectors (4.2).

8) PVOs should approach pesticide firms for information and publications regarding pesticide application techniques and appropriate safety measures (4.4.4.2).

IPM:

9) PVOs should make better use of available Mozambique and international pest and pesticide management resources and expertise, networking and collaborating in order to have maximum access to information and technical support (4.3).

10) PVOs should constantly seek new ways to increase the safety, practicality and profitability of farmers' pest management practices, testing non-chemical pest control methods, botanical and biorational pesticides, reduced pesticide application rates, appropriate application methods and other judicious practices (5.2).

11) An annual national-level IPM workshop should be organized by USAID, with technical input/guidance from DSV/DANIDA and other in-country IPM experts, to facilitate better communication and collaboration among PVOs and between PVOs and their government counterparts regarding policy, technical information, cooperative research and training (5.3.2.1).

12) USAID/W should convene an international IPM workshop (or a series of regional workshops) for African PVOs to develop a consensus on IPM-related policy issues, generate and ratify IPM action guidelines for field activities, and to network for information, training and research (5.3.2.1).

13) Organizing skills existing at community level should be tapped for implementing IPM measures that are most effective when applied community-wide, and in support of extension programs and communication campaigns (5.3.2.2).

Training:

14) It would be advisable for the PVO Support Project to hire a specialist training consultant to help PVOs design IPM and pesticide management training programs that are appropriate for their needs, are targeted to specific, disparate training audiences, and apply effective participatory training methodology (5.7).

15) Training courses should be planned in consultation with, and, where appropriate, presented collaboratively with, other projects and agencies with similar training needs (5.7.1.1).

16) USAID/Mozambique should support the development of Mozambican capacity in the areas of agriculture, public health and environmental protection through specialized training and study tours for government officers. Relevant subjects include IPM, pesticide safety, regulation, management and application, recognition and treatment of pesticide poisoning, and environmental monitoring (5.7.2).

Environmental monitoring:

17) Project PVOs should assist with, and use information generated by, GRM and donor agency environmental monitoring programs (5.5.4.2).

6.2.2 Endorsement of Selected Recommendations of the SEA for Locust and Grasshopper Control in Africa/Asia

The objectives and concerns of this SEA and the SEA for locust and grasshopper control in Mozambique (Belayneh 1993) are similar in many respects (see Sect. 2.1). Those held in common include IPM, mitigation of non-target pesticide effects, proper pesticide application and management, training and human resources, economic cost/benefit considerations, pesticide and environmental policy and applied research.

Accordingly, 20 of 38 recommendations made in the locust/grasshopper control SEA can be extended to pest control and pesticide management within the PVO Support Project and are endorsed here. These are paraphrased below by number from the locust/grasshopper control SEA, followed by commentary.

> *Recommendation 2.* An inventory and mapping program should be started to determine the extent and boundaries of environmentally fragile areas, so that unsprayed buffer zones can be maintained around them.

> *Recommendation 6.* There should be no pesticide application in environmentally fragile areas.

Project PVOs should map their areas of operation and use the maps/information in their activities and extension programs in order to protect sensitive habitats from exposure to pesticides (see 5.6).

> *Recommendation 3.* A system for dynamic inventory of pesticide chemical stocks should be developed.

Appropriate storage, inventory and record keeping procedures should be part of pesticide management training for PVO staff (see 5.7.1.1).

Recommendation 4. USAID should take an active role in assisting Mozambique to identify alternate use or means of disposal of pesticide stocks.

Recommendation 14. USAID should provide assistance to host governments in disposing of empty pesticide containers and pesticides that are obsolete or no longer usable for the purpose intended.

These recommendations are seconded with a view to improving pesticide stewardship in Mozambique (see 4.4.3.3). On the local level, proper disposal of empty pesticide containers should be part of PVOs' pesticide safety training (see 5.7.1.1).

Recommendation 7. Whenever possible, only those pesticides that have minimum impact on non-target species should be used.

Least-toxic pesticides are to be preferred by project PVOs (see 5.1, 5.2), and this includes choosing selective pesticides such as *Bacillus thuringiensis* (B.t.), which affect only a relatively narrow spectrum of organisms.

Recommendation 9. One of the criteria to be used in the selection of control techniques should be a minimization of the area to be sprayed.

Recommendation 21. Biological control agents (e.g. insect pathogens, predators and parasites) should be field-tested under African conditions.

Recommendation 26. No pesticide should be applied unless a working action-threshold for risk of pest damage is exceeded.

These recommendations are consistent with IPM recommendations made above for the PVO Support Project (see 5.3.1).

Recommendation 8. Pre- and post-treatment monitoring and sampling of selected nontarget organisms (including protected species) and water and/or soils should be carried out as an integral part of each control campaign.

Project PVOs rely chiefly on training and least-toxic pesticides to avoid damage to human health and the environment, and do not have the expertise or the mandate to take primary responsibility for environmental monitoring. However, they should assist with GOM and donor agency environmental monitoring in their areas of operation (see 4.4.4.2).

Recommendation 13. All pesticide containers should be appropriately labeled.

Appropriate labeling is now part of the pesticide registration process in Mozambique. Project PVOs are required to purchase only registered products, and thus should find pesticide labels adequate (see 4.4.1.4).

Recommendation 15. USAID should support the design, reproduction and presentation of public education materials on pesticide safety (eg TV, radio, posters, booklets, etc.). This would include such subjects as safely using effective pesticides, ecology, pest management and the hazards of pesticides. The goal would be to help policy makers and local populations recognize potential health problems related to pesticide use.

Recommendation 16. Training courses should be designed and presented for health personnel in all areas where pesticides are used frequently.

Recommendation 22. A comprehensive training program should be developed for NGO and USAID Mission personnel who have responsibility for (pest) control operations. This will take advantage of existing materials and those under development, in order to save resources.

Recommendation 23. Local training programs are needed covering pesticide storage management, environmental monitoring and public health.

These recommendations are consistent with training and extension recommendations made above for the PVO Support Project (see 5.7). With regard to communication campaigns, the Centro de Formacao Agraria is supposed to have excellent facilities, equipment and experience. It may be a valuable collaborator and a suitable recipient for USAID/Mozambique support.

Recommendation 17. Each health center and dispensary located in an area where pesticide poisonings may occur should be supplied with large wall posters in which the diagnosis and treatment of specific poisonings are depicted. The centers and dispensaries should also be provided with medicines and antidotes required for treatment of pesticide poisoning cases.

This recommendation should be implemented by the PVO Support Project. Project PVOs should keep a small kit with antidotes in a known, designated place at field site(s) where pesticides are stored and handled. Where applicable, the telephone number of the nearest doctor or other medical help should be posted in a conspicuous place in the pesticide storage/handling area.

Recommendation 18. Presently available tests for monitoring human exposure to pesticides should be evaluated in the field. This includes measurement of cholinesterase levels in small samples of blood as a screening test.

Project PVOs with personnel who should be monitored might contact Drs. Melo and Chirindzi of the MOH Public Health Toxicology Unit to ask how to participate in such evaluation (see 5.5.4.1).

Recommendation 27. USAID should provide assistance to host countries in drawing up regulations on the registration and management of pesticides and the drafting of environmental policy.

This recommendation is seconded by the present SEA (see 5.5.4.2).

Recommendation 28. A pesticide use inventory covering all treatments in agricultural programs should be developed.

PVOs should keep accurate records of pesticide purchases and use.

Recommendation 30. Appropriate technical assistance, education and training should be provided to NGOs and the crop protection service with a view to making crop protection activities eventually self-sustaining.

Recommendations made above for the PVO Support Project address this objective of sustainable pest management, especially those concerning the discontinuation of pesticide subsidies, action thresholds for pesticide application and testing the economic viability of pesticide use (see 4.4.2, 5.3.1).

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ANNEXES

Annex A.1 Persons Contacted

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Jack Miller, Deputy Mission Director
Cheryl McCarthy, Program Officer
Darell McIntyre, Agricultural and Rural Development Officer
Sidney Bliss, PVO Support Project Development Officer
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Stryk Thomas, AFR/ARTS/FARA

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Av. Martires da Mueda, 596. Tel:49:20:64/5/6
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Agostino Xavier, Head, Provincial Agriculture Service

SOFALA PROVINCE

Armando Dique, Head. Dondo District Agriculture Service
Sandra Silva, Extension Director

MINISTRY OF HEALTH:

Dr. Evaristo Baquete, Dept. of Environmental Hygiene. Public Health (Toxicology Unit) (Rua de Nachingueia, 486, first floor, tel. 49.28.13)
Dr. Chirindza, Public Health (Toxicology Unit) (Rua de Nachingueia, 486, first floor, tel. 49.28.13)
Dr. Almeida Franco, Malaria Section, first floor (tel. 42.71.31/4)

EDUARDO MONDLANE UNIVERSITY:

Dr. U. Aswathanarayana, Faculty of Engineering, tel.42.20.62

PESTICIDE IMPORTERS AND DISTRIBUTORS:

Ciba-Geigy (Av. Mao Tse Tung, 519, Fifth Floor, tel. 49.25.17)
Fernando Carvalheira, Agronomist for North Zone (Nampula)

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INTERQUIMICA Rua de Bagamoio, 333. tel.
Antonio Cumaio, Importation Technical Officer - Agriculture Dept.

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Sumitomo Corporation (Av. Martires de Machava, 500, First Floor, tel. 49.22.20/1/2)
Orlando A. dos Santos, Ass't. to General Manager

Shell (Av. Martires de Inhaminga, 170, Fifth Floor, tel.42.35.59)
A. Santiago Coelho, Manager

Annex A.2 Recommended SEA Distribution

USAID:
AID/AFR/ARTS/FARA
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AID/AFR/AA/DRCO
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USAID IPM Working Group

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U. Aswathanarayana, Eduardo Mondlane University
Dr. Chirindza, MOH, Public Health (Toxicology Unit)
Dr. Almeida Franco, MOH, Malaria Section

Others elsewhere:

Gerard Schulten, FAO/AGPP, Rome
Malcolm Iles, International IPM Working Group, U.K.

InterAction, Washington, D.C.NGOs' headquarters offices
A.J. Shrivastava, World Bank

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT OF PEST MANAGEMENT AND PESTICIDE USE IN THE PRIVATE VOLUNTARY ORGANIZATION SUPPORT PROJECT OF USAID/MOZAMBIQUE

Supplemental to the Programmatic Environmental Assessment of the USAID/Mozambique Transition Development Program

VOLUME II - ANNEXES.

Prepared By

Herbert H. Fisher, Team Leader
Pesticide Management, Evaluation and Training Specialist
International Agricultural Consultant
821 N.W. Edgewood Place
Albany, Oregon 97321/USA

Patricia C. Matteson, IPM Specialist
Pest Management Consultant and Departmental Collaborator
Department of Entomology
Iowa State University
Ames, Iowa 50011-3140/USA

and

Walter I. Knausenberger
Environmental Advisor
Division of Food, Agriculture and Resources Analysis
Office of Analysis, Research and Technical Support
U.S. Agency for International Development
Washington, D.C. 20523-0089

U.S. Agency for International Development
USAID/Mozambique
Maputo, Mozambique

January 1994

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ANNEX B. USAID DOCUMENTS

B.1 Scope of Work for The Supplemental Environmental Assessment of Pest and Pesticide Management in Mozambique for The Private Voluntary Organization Support Project.

B.2 Initial Environmental Examination for the PVO Support Project (656-0217), Amendment August 1993.

B.3 Status of USAID Financing of PVO Support Project.

B.4 Update on USAID - Approved List of Pesticides for Lucust/Grasshopper Control.

Annex B.1 SCOPE OF WORK

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR PEST AND PESTICIDE MANAGEMENT IN MOZAMBIQUE

The consultants will perform the services outlined below and will complete all elements required under the terms and conditions of this agreement. The consultants will be expected to work independently, but in close conjunction with the USAID/Mozambique Agricultural Development Officer and the AFR/ARTS/FARA Environmental Advisor responsible for Pest and Pesticide Management. The FARA 1993 Analytical Agenda includes an activity element (93 ENV-1a) entitled "Environmentally Superior Technologies for Sustainable Agriculture: Pest and Pesticide Management". The accompanying SOW is consistent with that element.

BACKGROUND

USAID/Mozambique is committed to an 18- to 24-month program to support Mozambique's transition from short-term relief through rehabilitation and reconstruction, in the interest of long-term development. The program's main elements include: 1) post-drought-related relief assistance; 2) support for the Peace Process, namely demobilization, de-mining, elections; rural rehabilitation and recovery (through grants to PVOs); rural roads rehabilitation; and 3) a Core Development Program, consisting of policy dialogue, legal sector reform, PVO Support, Primary Health Care, long and short-term training, Private Sector Support, commercial food aid, and land tenure research. In addition, the mission is preparing for a new long-term Country Development Strategy Plan (CPSP).

As central elements of USAID Environmental Procedures, Programmatic Environmental Assessments (PEAs) are undertaken to assess the environmental effects of a number of individual actions and their cumulative environmental impact in a given country or geographic area, or the environmental impacts that are generic or common to a class of actions. Programmatic evaluations of classes of actions are also conducted to better define the nature of actions to be taken and establish criteria for additional decision-making parameters, and/or for program implementation which will minimize the adverse effects of such actions. Collaboration and consultations between A.I.D. and host government (GRM) are indispensable features of the assessment.

USAID/Mozambique is undertaking a PEA of its transition Development Program because: 1) a potential exists for immediate and derived environmental impact of the various programs and activities, in their aggregate; 2) conclusions from the assessment are expected to be useful to inform programmatic decisions about sustainable development strategies which the mission could support; and 3) mitigation measures are needed which are specifically applicable to USAID's Transition Program, implementable both immediately and in the medium- and long- term.

The Scoping Statement for the Transition Program PEA identified the need to assess the use of pesticides which might occur in Mozambique as a direct or indirect result of assistance provided through the mission's program. Thus, it was determined that the pest and pesticide management aspect justified a specific Supplemental Environmental Assessment (SEA) to the overall PEA of the USAID/Mozambique Transition Development Program, to be conducted June/July 1993.

This SEA will coincide with and complement another, legally distinct, SEA which being carried out in the same period to cover possible locust and grasshopper interventions in Mozambique, under the PEA for USAID assistance to Locust and Grasshopper Control in Africa and Asia. The latter SEA is sponsored by the regional Africa Emergency Locust & Grasshopper Assistance Project, now managed by AFR/ONI/TPPI.

PURPOSE

To carry out a specific Supplemental Environmental Assessment of Pest and Pesticide Management in Mozambique, as related to the Transition Program PEA.

STATEMENT OF WORK

1. General

This Pest and Pesticide Management SEA will be carried out by two specialists, one in Integrated Pest Management (AID/AFR/ARTS/FARA-funded), the other in Pesticide Management, Evaluation and Training (mission-funded). The primary aim of the assignment is to address A.I.D. Environmental Procedures (22 CFR Sect. 216, or "Reg 16") in a manner appropriate to the unique circumstances of this SEA and country. The overall task is to carry out an SEA applicable to the entire country and a broad range of possible pesticide/pest/crop combinations, and presumably medical/veterinary pest issues, with an emphasis on implementation via PVOs and on introducing IPM and alternative control principles. The SEA will concentrate on agricultural pesticide use, covering mainly a prioritized set of crop protection issues (crop/pest/pesticide combinations), with attention to livestock ectoparasite (mainly ticks and tse-tse fly) control. Some, but secondary, attention will need to be given to the medical entomology aspect, i.e., the extent to which control of human disease vectors such as mosquitoes is an activity in which the GRM or PVOs engage and is related to support by USAID.

Serving as team leader will be the Integrated Pest Management (IPM) Specialist who will emphasize (1) the PVO-specific pesticide use, management and mitigation issues, (2) introducing integrated pest management principles and implementation guidance vis-a-vis the socio-economic context of Mozambique, (3) vector control and veterinary ectoparasites, (4) ensuring that the P/PM SEA is fully consistent and integrated with the TP PEA, and (5) discussions with other donors regarding their activities in this sector. The Pesticide Management, Evaluation and Training Specialist will: (1) emphasize the pesticide management issues vis-a-vis meeting USAID environmental procedures and EPA requirements, (2) focus on crop and plant protection matters, (3) ensure consistency and complementarity with the locust/grasshopper SEA to be produced by the AELGA project, coordinating the provisions and recommendations, and (4) being Lusophone, focus more on the dialogue with GRM counterparts. Further, the two consultants will split among themselves specific elements of the SOW and related tasks as appropriate.

The SEA analysis will be supportive of general agricultural development in Mozambique, and must be closely linked to the Transition Program PEA. The mission's current, and probable future, programs in this sector will not emphasize the public sector, but will concentrate on working with the NGOs including PVOs, and eventually probably private producer and

marketing groups. A full pesticide sub-sector analysis, including implications of privatization of input and output marketing aspects is, however, beyond the scope of this SEA.

2. Satisfying A.I.D. Pesticide Procedures

To address the Agency's Pesticide Procedures, the team must determine the extent to which the Transition Program does/will involve the use of agrichemicals, particularly pesticides. When assistance involves procurement or use, or both, of pesticides registered for the same or similar uses by USEPA without restriction, the SEA shall include a section evaluating the economic, social and environmental risks and benefits of the planned pesticide use to determine whether the use may result in significant environmental impact. Note that "use" is understood broadly to include, for example, facilitating storage of pesticides, or the application of pesticides by provision of fuel for transport of pesticides. Factors to be considered in such an evaluation shall include, but not be limited to the following:

(1) The USEPA registration status of the requested pesticide(s);
(2) The basis for selection of the requested pesticide(s);
(3) The extent to which the proposed pesticide use is part of an integrated pest management program;
(4) The proposed method or methods of application, including availability of appropriate application and safety equipment;
(5) Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use and measures available to minimize such hazards;
(6) The effectiveness of the requested pesticide(s) for the proposed use;
(7) Compatibility of the proposed pesticide(s) with target and non-target ecosystems;
(8) The conditions under which the pesticide(s) are to be used, including climate, flora, fauna, geography, hydrology, and soils;
(9) The availability and effectiveness of other pesticides or non-chemical control methods;
(10) The requesting country's ability to regulate or control the distribution, storage, use and disposal of the requested pesticide(s);
(11) The provisions made for training of users and applicators; and,
(12) The provisions made for monitoring the use and effectiveness of the pesticide(s).

3. Examining PVO and NGO activities

The activities to be assessed for direct impacts mainly relate to agricultural inputs supply and use, via the PVO Support Project. Additional relevant activities may include those promoting farm productivity and marketing, as well as basic health care, including malaria control and immunization. The nature of the pest management measures supported through development assistance and emergency pest control measures undertaken needs to be assessed. The scale, by individual project and in their aggregate, of these activities has not yet been well characterized or quantified.

This will be a task of the SEA team, which will review the results of the PEA team's work regarding PVO activities. The PVO Support Project, and the proposals submitted for funding by it, will need to reflect cognizance of pest and pesticide management principles. The ultimate objective is to ensure that the PVOs have the capacity to mitigate the potential negative impacts of pesticide use and are familiar with alternative pest management strategies. In this way,

presumably the great majority of projects proposed could be reviewed and approved by the Mission environmental officer without Regional Environmental Officer involvement.

The implications for pesticide use under activities sponsored by the Private Sector Support Project (such as the Commodity Import Program) of the PSSP should be examined as well. This also applies to any possible public health interventions (disease vector control programs, mainly). Unless pesticides are a notable element of the health services sector, which does not appear to be the case, this SEA will not need to further address health services.

4. Assessment of Pesticide Management Capacities in Mozambique

The following is an illustrative list of elements which need to be elucidated:
-- Registration and Development of Pesticides. Product registration and licensing define the conditions of market access for individual products.
-- Procurement and Supply system.
-- Product stewardship (training and infrastructure to support product and technology dissemination to the user, including follow-up)
-- Pesticide Registration Process.
-- Pesticide distributor licensing.

5. Mitigation Plan

The SEA shall include to the extent practicable, provisions designed to mitigate potential adverse effects of the pesticide. When the pesticide evaluation does not indicate a potentially unreasonable risk arising from a given pesticide use, the SEA shall nevertheless be prepared if the environmental effects of the project otherwise require further assessment.

This should be linked to the Environmental Monitoring, Evaluation and Mitigation process addressed in the PEA and Scoping Statement.

6. Training

The SEA should examine needs and opportunities for support to training (for PVO-linked distributors, agents and farmers). The training should emphasize practical on-the-job, non-formal training techniques and strongly emphasize integrated pest management principles and practices.

7. Extending Integrated Pest Management (IPM)

The SEA provides an opportunity to promote the adoption of appropriate pesticide management practices and the introduction of alternative pest management technologies. How this would be best supported would need to be elaborated, but on approach could be to encourage the programmatic adoption by the PVOs of IPM policies and principles in their extension and crop production improvement strategies. In this respect, the SEA team will work with select PVOs in determining their capacities and needs with respect to pest management. This will involve working with the draft USAID "Africa Bureau Environmental Guidelines for PVO/NGO Field

Use".

Perhaps through the Mozambique National Environmental Management Plan, the GRM could also be encouraged to formulate and formalize policy statements regarding an endorsement of IPM as a national strategy. Any IPM policy should emphasize the use of "least-toxic" pesticides if any are needed at all.

REPORTING REQUIREMENTS AND TECHNICAL DIRECTION

Technical direction will be provided by Darrel McIntyre, USAID/Mozambique ADO (258-1-490726 or -744484, fax: 258-1-492098) and AID/AFR/ARTS/FARA cognizant technical officer Walter I. Knausenberger, Environmental Advisor (703-235-3826, fax: 703-235-3805).

The consultants will be briefed in Washington, D.C. prior to departing for Mozambique, and will prepare their workplan within two days of arrival in country, in consultation with the mission ADO and PVO Support Project, who will assist with contacts and in-country travel needs. Mission approval must be sought for all contacts with GRM officials and travel outside Maputo. The consultants will confer with mission staff at least weekly on progress being made on assembly of the SEA. A review draft will be presented prior to final de-briefing at the Mission. A clean and consistent draft will be submitted for review and approval by USAID prior to departure. A final draft will be submitted within two weeks after receiving the go-ahead, following review by the mission and Africa Bureau. The final document must be submitted in hardcopy and electronic form, ready-to-use, in WordPerfect 5.1.

PERIOD OF PERFORMANCE

The work will be done on a full-time basis beginning on or about 1 August 1993, for 25 days (per consultant), including at least 18 days (assuming 6-day work weeks) in country, plus research and preparation time, briefings, and travel.
The estimated completion date for all work is 30 September 1994.

DELIVERABLES

1. A Supplemental Environmental Assessment report addressing the aspects required under Reg 16, and including findings and recommendations applicable to implementation of pesticide management and IPM decision-making and follow-up options. The report will include specific sections identifying relationships to the Transition Program PEA and the Locust/Grasshopper SEA.

2. A review of the "Environmental Guidelines for PVO/NGO Field Use" with respect to how they could be improved prior to finalization.

LOGISTIC SUPPORT, USE OF GOVERNMENT FACILITIES & PERSONNEL

While in country, the USAID mission and/or the cooperators in-country shall provide limited office space and equipment as mutually arranged. Arrangements for housing and travel shall be made by the Contractor as required, with assistance by the mission as appropriate. All

travel plans must be vetted with and approved by the Mission. The consultants are responsible for all other logistic support required in the performance of this Scope of Work.

LANGUAGE REQUIREMENTS

English and Portuguese

WORK WEEK

The Contractor is authorized up to a six-day work week for work performed outside the United States.

EMERGENCY LOCATOR INFORMATION

The contractors will provide Emergency Locator Information to the Mission Administrative Officer on or before the arrival in country.

QUALIFICATIONS

Contractors will have:

1. At least 15 years of experience in international pest and pesticide management program development and assessment, including substantial experience in Africa or other overseas locations, and in working with USAID.

2. Close familiarity with farmer-level practices relating to crop protection in West Africa, and with international, regional and national institutions involved in pest management in the West African region.

3. Substantial experience (10 years) in pest management practices appropriate to small farmers in the developing world, and commitment to least-toxic pest management approaches.

4. Worked closely in interdisciplinary teams involving social scientists, economists and agronomists on problems having a bearing on pest management.

5. Applicable and substantial experience in pest management in at least two other major regions of the world.

6. Fluency in Portuguese (at least one team member).

7. Demonstrated superior writing ability.

Annex B.2

Initial Environmental Examination

COUNTRY:	Mozambique
PROJECT TITLE/NUMBER:	PVO Support Project/656-0217
FUNDING:	Added in FY 93 - US$40,000,000; LOP - US$90,000,000
IEE PREPARED BY:	Eric R. Loken, Regional Environmental Officer, REDSO/ESA/ANR

ENVIRONMENTAL ACTION(S) RECOMMENDED:	
Positive Determination	
Negative Determination	X
Negative Declaration	X
Categorical Exclusion	X
Deferral	X

SUMMARY OF FINDINGS:

The purpose of the PVO Support Project is to reduce vulnerability to absolute poverty, induced by the rural insurgency, within targeted population groups in Mozambique. Accordingly, this activity constitutes a critical element of the Mission's planned high-priority assistance for Mozambique's transition from a state of civil war and drought-induced emergency to a stable, democratic and economically-productive society, i.e., the Transition Program.

The Mission is currently in the process of completing a Programmatic Environmental Assessment (PEA) of all salient activities planned in support of this Transition Program assistance, including aspects of the subject PVO Support Project. The purpose of the PEA is to provide the Mission, the various implementing agents, and concerned government counterparts with an efficient, effective and country-specific mechanism--including design and implementation guidelines, decision criteria, review procedures and monitoring and mitigation guidance--for ensuring that this Transition Program assistance is delivered in an environmentally sound and sustainable manner.

In the case of the present Project Amendment a Negative Declaration pursuant to Section 216.3 (a)(3)(ii) and (iii) of the Agency's Environmental Procedures (22 CFR 216), is recommended with the understanding that the Mission will implement this amended Project, to the best of its ability, in full accordance with the findings and recommendations of the final, approved PEA.

However, because the PEA is not yet approved by the Bureau, it is recommended that the environmental threshold decision as to a Negative Declaration for the PVO Support Project be deferred until the PEA is approved (likely by September 1993). In the meantime, the draft PEA will provide some guidance, and the procedure for environmental review which has applied thus far, be kept in effect.

The present procedure used in the PVO Project is that, sub-grant proposals are designed and implemented with reference to the Africa Bureau *PVO/NGO Environmental Guidelines*, and these Guidelines are also utilized by the Mission Environmental Officer in review and approval of the proposals for sub-grants. Also, all sub-grant activities are classified according to the 3-tier category scheme which is also outlined below in this present IEE.

Funds will not be obligated under the sub-grants until individual environmental reviews of the sub-grant activities are completed on a case-by-case basis, in reference to the Guidelines and the draft PEA. The provisions of the draft PEA and the Guidelines will be adhered to during sub-grant implementation.

The PEA will provide the framework to ensure that the Transition Program is carried out in an environmentally sound and sustainable manner. On the strength of an approved PEA, subsequent environmental assessment on individual activities would only be needed in the unlikely event that the activities may result in significant negative environmental impacts not adequately anticipated by the PEA (22 CFR 216.6(d)).

Regarding the present IEE, a Negative Determination is recommended for activities which will have no significant, or only minor impact, on the environment, but which may need some modification during implementation to assure mitigation of predictable impacts (Category 2).

A Categorical Exclusion is recommended for those aspects of the Project which will not significantly affect the environment, pursuant to Sections 216.2 (c) (2) (i), (iii) and (viii) of said Procedures (Category 1).

Category 3 activities with potentially significant environmental impact, thus requiring review by the REDSO/ESA REO and/or the Bureau Environmental Officer, are recommended for Deferral.

It is recommended that the Delegation of Authority for local environmental approval by the mission of the individual sub-grant activities be issued by the BEO in accordance with the environmental review procedure outlined herein, and on the basis of a nearly completed Programmatic Environmental Assessment. In the unlikely event that it is necessary, the Mission Environmental Officer (MEO) should pass to the Regional Environmental Officer and Bureau Environmental Officer for review

any Category 3, and possibly some Category 2 sub-grants in order to assist in the determination as to the need for further environmental assessment and mitigation activities. Also, as in the past, up-dated lists of sub-grants, with a summary of activities, will be submitted to the REO and BEO, to keep them apprised of the area and scope of activities involved. The activities proposed under this project amendment are not anticipated to have a significant impact on threatened or endangered species or critical habitat.

IEE APPROVED BY: _____
Roger D. Carlson, Director, USAID/Mozambique

CONCURRENCE: 93 State
Bureau Environmental Officer
John J. Gaudet, AFR/ARTS/FARA

APPROVED: X
DISAPPROVED: _____
DATE: 8/4/93

123

CLEARANCE:

GC/AFR: Draft Date: 8/4/93

RMason, PVO: 7/9/93 (draft)
SBliss, PVO: 7/9/93 (draft)
MAlexander, RLA: 7/24/93 (draft)
ELoken, REO: 7/10/93 (draft)
JDaane, ENG: _____
CMcCarthy, PRM: _____
JMiller, DDIR: _____

INITIAL ENVIRONMENTAL EXAMINATION

Project Description

The purpose of the PVO Support Project is to reduce vulnerability to absolute poverty, induced by the rural insurgency, within targeted population groups in Mozambique. Subsequent Amendments to the Project have expanded the target beneficiary population to include those rendered vulnerable from two successive years of drought conditions across Mozambique's central and southern provinces. This latest, proposed Project Amendment will enable A.I.D., acting through its respective implementing agents--Private and Voluntary Organizations or PVOs, also to provide assistance to activities which in the post-war transition period will help to sustain the peace and begin a return to more settled conditions. Such activities include assisting communities to offer resettling refugees, displaced people and demobilized soldiers and families with the basic necessities of: (a) physical security, including ease of access and a chance to build or repair a secure shelter; (b) food security, including food aid only as required for an interim period and until an agricultural economy can be reestablished, for example, with timely provision of seeds and tools; and (c) basic health facilities, including facilities and trained personnel to treat diseases and poor health that habitually accompany disruption and makeshift conditions.

Discussion

The Mission is currently in the process of completing a Programmatic Environmental Assessment (PEA) of all salient program activities planned for implementation in support of Mozambique's transition from a state of civil war and drought-induced emergency to a stable, democratic and economically-productive society, i.e., the Transition Program. The purpose of this Assessment is to provide the Mission, the various implementing agents (e.g., contractors, NGOs/PVOs, etc.) and concerned government counterparts with an efficient, effective and country-specific mechanism--including design and implementation guidelines, decision criteria, review procedures and monitoring and mitigation guidance--for ensuring that this Transition Program assistance is delivered in an environmentally sound and sustainable manner.

The subject Project constitutes a critical element of this Transition Program support through the provision of basic necessities for the war-displaced population and demobilized soldiers and families returning to the rural sector to reestablish a productive and self-sustaining way of life. Accordingly, all salient aspects of this Project, as further amended herein, will be specifically addressed in the ongoing PEA.

Environmental Monitoring and Mitigation by PVOs/NGOs

The PEA will provide the basis for evaluation of the IEEs and review process presently invoked for the existing projects. In drafting their proposals, the PVOs/NGOs will address the way in which their interventions will be monitored and evaluated during the course of the project. Indicators to be used in monitoring should be spelled out in the design of the grants, and an environmental review will be included in each proposal.

So that the individual interventions are designed in an environmentally-sustainable manner, the Mission Environmental Officer (MEO) and/or project officers should provide each of the NGOs/PVOs involved in the transition program with a copy of the AFR "Environmental Guidelines for NGO/PVO Field Use". The proposals will also spell out how negative impacts will be mitigated, when and if they are detected during monitoring and evaluation.

The below streamlined procedure for ranking proposals is an approach which has been informally applied in the Project thus far, based on the above guidelines. Thus, the PVO grant manager categorizes the proposed interventions according to the following scheme:

Category 1: sub-projects or grants that would normally qualify for a categorical exclusion under Reg 16 (e.g., community awareness initiatives, training at any level, provision of technical assistance, etc.). Construction or repair of facilities under 10,000 sq. ft. (approx. 1,000 sq. m.) would fall under this category.

Category 2: sub-projects or grants that would normally qualify for a negative determination under Reg 16 based on the fact that the grantee used an environmentally-sound approach to the activity design (e.g., the grant design followed, and the grant manager has access to and will follow, a series of guidelines for the design of small-scale environmentally-sound activities in forestry, agriculture, irrigation, water supply, rural roads, etc.). Extensive rehabilitation of facilities and construction of structures exceeding 10,000 sq. ft. would normally fall in category 2. Funding levels would normally also be in excess of $100,000 per project.

Category 3: activities that have a clear potential for undesirable environmental impacts, such as those involving land development, forest harvesting, planned resettlement, penetration road building, substantial potable water and sewage construction, and projects involving the procurement and/or use of pesticides. Also, some light industrial plant production or processing (sawmill operation, agro-industrial processing of forestry products) could qualify. Finally, any intervention operating in a critical habitat for

threatened or endangered species, or other similar activity where a possibility exists for significant negative environmental impact, must be placed in this category. All items listed in Reg. 16 (Sect. 216.2(d)(1)) are automatically included.

The following scenario for review and approval is to be applied:

The Mission Environmental Officer will review grants in all the above categories, and pass on any grants in Category 3, and possibly some from Category 2, to the Regional Environmental and Legal Officers for further review. These will then be passed to the Bureau Environmental Officer for approval.

The PEA will provide the framework to ensure that the transition program is delivered in an environmentally sound and sustainable manner. On the strength of an approved PEA, subsequent environmental assessment on individual activities would only be needed in the unlikely event that the activities may result in significant negative environmental impacts not adequately anticipated by the PEA (22 CFR 216.6 (d)).

It is assumed that the majority of grants will fall within Categories 1 and 2, and could, therefore, be approved locally. Mission will receive from the Bureau Environmental Officer a Delegation of Authority (DOA) for this purpose. The Mission Environmental Officer (MEO) and/or PVO grant manager would on a routine basis pass to the REO and Bureau Environmental Officer an up-dated list of grants, with summary of activity where necessary, in order to keep them apprised of the area and scope of activities involved.

If the funding level is in excess of $100,000, sub-projects in Categories 2 and 3 will still need to be reviewed by the Regional and/or Bureau Environmental and Legal Officers.

Recommended Environmental Threshold Decision

In the case of the present Project Amendment a Negative Declaration pursuant to Section 216.3 (a)(3)(ii) and (iii) of the Agency's Environmental Procedures (22 CFR 216), is recommended with the understanding that the Mission will implement this amended Project, to the best of its ability, in full accordance with the findings and recommendations of the final, approved PEA.

However, because the PEA is not yet approved by the Bureau, it is recommended that the environmental threshold decision as to a Negative Declaration for the PVO Support Project be deferred until the PEA is approved (likely by September 1993). In the meantime, the draft PEA will provide some guidance, and the procedure for environmental review which has applied thus far will be kept in effect.

The present procedure used in the PVO Project is that, sub-grant proposals are designed and implemented with reference to the

Africa Bureau *PVO/NGO Environmental Guidelines*, and these Guidelines are also utilized by the Mission Environmental Officer in review and approval of the proposals for sub-grants. Also, all sub-grant activities are classified according to the 3-tier category scheme which is also outlined below in this present IEE.

Funds will not be obligated under the sub-grants until individual environmental reviews of the sub-grant activities are completed on a case-by-case basis, in reference to the Guidelines and the draft PEA. The provisions of the draft PEA and the Guidelines will be adhered to during sub-grant implementation.

The PEA will provide the framework to ensure that the Transition Program is carried out in an environmentally sound and sustainable manner. On the strength of an approved PEA, subsequent environmental assessment on individual activities would only be needed in the unlikely event that the activities may result in significant negative environmental impacts not adequately anticipated by the PEA (22 CFR 216.6(d)).

Regarding the present IEE, a Negative Determination is recommended for activities which will have no significant, or only minor impact on the environment, but which may need some modification during implementation to assure mitigation of predictable impacts (Category 2).

A Categorical Exclusion is recommended for those aspects of the Project which will not significantly affect the environment, pursuant to Sections 216.2 (c) (2) (i), (iii) and (viii) of said Procedures (Category 1).

Category 3 activities with potentially significant environmental impact, thus requiring review by the REDSO/ESA REO and/or the Bureau Environmental Officer, are recommended for Deferral.

It is recommended that the Delegation of Authority for local environmental approval by the mission of the individual sub-grant activities be issued by the BEO in accordance with the environmental review procedure outlined herein, and on the basis of a nearly completed Programmatic Environmental Assessment. In the unlikely event that it is necessary, the Mission Environmental Officer (MEO) should pass to the Regional Environmental Officer and Bureau Environmental Officer for review any Category 3, and possibly some Category 2 sub-grants, in order to assist in the determination as to the need for further environmental assessment and mitigation activities. Also, as in the past, up-dated lists of sub-grants, with a summary of activities, will be submitted to the REO and BEO, to keep them apprised of the area and scope of activities involved.

The activities proposed under this project amendment are not anticipated to have a significant impact on threatened or endangered species or critical habitat.

Annex B.3. Status of USAID Financing of PVO Support Project (May 1993

PVO Support Project 656-0217

PVO	Grant	Dates	Grant $	Description	Location
COMPLETED GRANTS					
CARE	G-SS-0013	12/01/90-03/22/93	3,059,371	LSU Support to Food Logistics Unit	Nationwide
SCF	G-SS-2053	09/01/91-02/28/93	1,820,503	Children & War	Sub-Regional 5 Provinces
Africare	G-SS-0018	07/30/90-12/31/92	256,111	Water	Beira
ON GOING GRANTS					
CARE	A-00-2037	03/26/92-12/31/93	5,416,086	LSU Support to Food Logistics Unit	Nationwide
CARE	G-SS-3029	07/01/93 12/31/94	867,468	Water & Sanitation	Inhambane Province
CARE		11/01/93 04/30/95		Food Security & Rural Rehabilitation	Machaze District Manica Province
CARE	G-00-3047	09/01/93 12/31/95	484,933	Seed Distribution	Machaze District Manica Province
CARE	G-00-3046	09/01/93 02/28/94	234,793	Cistern rehabilitation Pump repair/installation	Machaze District Manica Province
FHI	G-SS-0016	07/01/90-06/30/94	6,470,108	Agricultural Recovery	Dondo, Buzi, Gorongoza, Nhamlanda Marromeu Districts, Sofala Province
ADRA	G-SS-0017	07/31/90 12/31/93	1,233,849	Agricultural Recovery	Inhambane Province
WVRD	G-SS-0014	07/03/90-09/30/94	9,216,960	Rural & Ag Recovery, Child Survival	Tete Manica, Sofala Zambezia Provinces
WVRD				Child Survival	Changara District, Tete Province Nicoadala District, Zambezi Province
WRC	G-SS-3003	10/16/92-08/31/94	937,647	Water Supply & Agricultural Recovery	Limpopo Corridor Gaza Province
Chimoio	A-		5,185,092	Water Supply Rehabilitation pipeline	Chimoio Manica Province
MCD	G-SS-3011	04/30/93-04/01/95	1,213,122	Water, Sanitation & Health	Cuamba District Niassa Province
Salesians	G-SS-3030		565,000	Orphanage Repair & Education	Maputo
SCF	G-SS-3016	04/01/93 03/31/95	3,626,205	Children & War	Malawi, Zimbabawe 6 Provinces Mozambique*
SCF	G-SS-0015	08/20/90-12/31/93	2,823,446	Rural Rehabilitation & Child Survival	Gaza Province
Africare	G-00-3022	07/01/93-06/30/96	2,450,113	Water, Sanitation & Health	Beira City, Sofala Province
MHC	G-SS-2051	05/26/92-03/31/94	2,040,820	Health Education	Manica Province
AICF	G-00-3048	10/01/93-09/30/94	321,820	Water, Nutrition, MCH	Murraca, Sena in Caia District Sofala Province
Up Coming Grants					
PSI				Communication & Marketing/AIDs	Maputo, Beira Corridor
SCF	Follow on Grant			Rural rehabilitation & Child Survival	Gaza Province
ADRA	Follow on Grant			Agricultural Recovery	Inhambane Province
ARC				Health (Rural Rehabilitation)	Tete Province

*Maputo, Gaza, Cabo Delgado, Nampula and Tete Provinces

PVO Support Project: Health Activities

PVO	Activity	Location	Donor	Status	Future	AID ACTION
SCF/US	Nutrition screening Therapeutic feeding Minor rehab health posts	Limpopo Corridor/Gaza JuliusN/ANeto	USAID $133,015 WFP for beans & maize	Ongoing proj + drought ext SCF recruiting 1 health staff (replacement)	Intensive feeding till 6/93 Proj ends 12/93	SCF preparing follow-on grant proposal
World Vision	Integrated child survival program	Changara,Tete Nicoadala, Zamb	USAID $500,000	Ongoing proj	ends 9/94	
World Vision	Child Survival inc: 4 Health Posts + 10,000 Survival Kits	Tete, Zambezia	USAID $2,095,000	PIO/T in clearance	3 year activity	Clear PIO/T
MHC	Community based district level health; capacity building DPS	Manica	USAID $2,040,820	Ongoing proj	ends 3/94	Incremental Funding needed?
AICF	Emergency health care & feedings in tandem with FHI food distributions	Marromeu District Sofala Province	OFDA $284,368	Phase II 7/93-1/31/94		
Africare	Health, water & sanitation education	Sofala (peri-urban Beira & Chibabava Dist)	USAID $1,533,245	Grant signed 9/8/93	3 year activity	Local Currency issue
AICF	2 HP reconstruct Est MCH system Nutrition Monitoring	Murraca,Sena Caia District Sofala Prov	USAID $312,820	Grant issued awaiting AICF signature	1 yr activity	Awaiting AICF signature
CARE	8 HP rehabilitated Nutrition monitoring/education	MachazeDistrict Sofala Province	USAID $1,107,532 *	PIO/T in draft	18 month activity	Clear PIO/T

*Funding is for all Food Security Grant activities
10/93
U:health

USAID/Mozambique

OFDA Grants:

PVO	Grant #	Dates	Grant $	Amend	Amend	Amend	Total
Airserv:	PDC-0008-G-00-0078	07/15/90-07/14/91	394,460	490,880 07/14/92	LOP 08/31/92	LOP 09/30/92	885,340 Requested 672,700
WVRD:Commodity Management	AOT-1067-G-00-2036	04/01/92-09/30/93	264,251	98,400 2/93			362,651
WVRD: Geheric Airlift	PDC-0008-G-00-0078	09/15/90-09/30/93	1,474,250				1,474,250
WVRD: Zambezi Corridor lift	AOT-1067-G-00-2127	06/05/92-04/04/93	1,771,000	1,916,158 2/93			3,687,158
FHI:Marromeu Airlift	AOT-2060-G-00-2142	08/01/92-05/31/93	795,000	1,125,630 2/93			1,920,000
CRS/CARITAS: Food Aid manage		9 mos	509,228 requested				
WRC:Food aid management/Gaza	AOT-2060-G-00-2153	09/18/92-04/30/93	479,682				
AICF: Emergency nutrition Sofala	AOT-1067-G-00-3026-00	02/08/93-06/30/93	206,388				206,388
AVSI Famine Relief Manica	Agreed						
CARE:Inhambane Wells							
Info manager & monitor		12 mos	376,200	Requested 2/23/93			
ICRC:Emergency Program	AOT-1067-G-00-2139	08/01/92-03/31/93	2,000,000				2.000,000
WFP: ITSH for SADE Emergency	AOT-2018-G-00-2013	06/19/92-05/31/93	2,500,000	Regional $			2,500,000
Totals							

U:ofda 6/93

8/93 MSF/France Cuiz Emergency Medical ± $250,000 thru 2/94

9/93 AirServ NGO AirSupport ± $2,500,000 thru 9/94

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ANNEX B.3

PVO Support Project
Status of Grants and Transition Proposals

Save the Children:
a. Sub-Regional Children and War Program.
Existing grant has been operating on a month-by-month no cost time extension since December 1992. (It ran out of funds in February 1993). It is scheduled now to end April 1, 1993. PIO/T for new 2 year grant is being circulated for clearance and signature. Expected start up date is April 1, 1993. We have requested the RCO to bridge the funding gap between the original end of the grant (November) and the actual end (March). The new grant foresees the phase-out of A.I.D. involvement in Zimbabwe and Malawi and an increase in C&W activity in Mozambique (into RENAMO areas and for returning refugees/dislocated people).

b. Gaza Program.
This on-going grant ends 12/31/93. We expect a new proposal for ag-recovery/child survival for Gaza Province in June.

Food for the Hungry: Agricultural Recovery Program.
FHI is preparing an expansion request to double the number of ag-paks from 30,000 to 60,000 and to extend the end date of the project from 12/31/93 to 6/93. This request was due in March. We will need a Review Committee and to do a PIO/T. FHI needs the new funding by May.

World Vision: Agricultural Recovery and Child Survival:
WVRD has submitted an expansion request for the next agricultural season. Their ag-pak distribution would go from 126,000 to 300,000 (116,000 funded by A.I.D.). The proposal also includes nutritional feedings and 10,000 survival kits for returnees. The Review Committee met 3/29/93 and the PIO/T now needs to be written. We can expect an expanded child survival request sometime in the near future. That will need a Review Committee and another PIO/T.

ADRA: Agricultural Recovery.
ADRA's agricultural recovery program grant provides support to 13,000 families. Their grant ends 12/31/93 and we expect a proposal for a new 2 year program of about the same size and activities around May 1993.

World Relief: Water and Agricultural Recovery:
WRC's grant ends 8/31/93. They are discussing the idea of expanding their agricultural and water activities, however it is uncertain whether they want additional A.I.D. funding or whether they have found another donor.

Mozambique Health Committee: Health Education.
MHC's grant ends 3/94. For the moment, A.I.D. disbursements have been suspended pending the results of the PVO and Controller's review scheduled for 3/30-4/2.

CARE:
a. LSU:
The LSU grant ends 12/31/93. It is currently being evaluated

and future funding and direction will depend on the results of the evaluation which are expected in June. The PIO/T for the second part of the incremental funding under the current grant is in the process of being written.

b. Inhambane Wells:
The Review Committee met on 3/18 and favorably reviewed the idea of funding a CARE water activity but asked for a more development oriented and hands-on approach. This has been discussed with CARE which agreed with the Review Committees findings. They are reworking the proposal into a longer (possibly 2 year) development oriented water and sanitation project. The revised proposal is due 4/10 and a PIO/T and IEE will need to be done.

Africare: Water and Sanitation.
Africare is working on their water and sanitation proposal which is due in April 5. We will do a desk review of the proposal to see if it is acceptable. If not, we will need to work with Africare to help them develop their proposal. We will then need to have a review meeting and do the PIO/T and an IEE.

Chimoio:
The PIO/T for the testing of the pipeline has been signed but is being held for Peter's go-ahead. No NGO bid on Chimoio and the RCO has approached Africare which is not very eager.

Medical Care Development: Niassa Water and Sanitation:
The RCO has completed the draft grant. He is waiting for MCD to submit the copy of their agreement with ADRA which is not expected until mid-April.

Salesian Missions:
The PIO/T and IEE are ready to be circulated for clearance and signature.

PSI:
The Review Committee met on 2/17 and had raised a number of issues that are being discussed with PSI. The PIO/T will need to be written.

AICF:
AICF would like to receive an A.I.D. grant for water and health (health post reconstruction) for northern Sofala Province. This is under discussion.

ARC:

IRC:

U:pdo\docs\list

Annex B.4 Update on USAID-Approved List of Pesticides for Locust/Grasshopper Control

APPR: ZH ( )

DRAFT: YB ( )

CLEAR: ( )

UNCLASSIFIED

CLEAR: ( )

CLEAR: ( )

AID/AFR/ONI/TPPI:YBELAYNEH:YB
04/08/93 (703) 235-5411
AID/AFR/ONI/TPPI:ZHAHN

CLEAR: ( )

CLEAR: ( )

AID/AFR/ONI/TPPI:VDREYER(DRAFT)
AID/NE:GJACKSON(DRAFT)
AID/AFR/ARTS:JGAUDET(DRAFT)
AID/GC/AFR:ESPRIGGS(DRAFT)

AID/AFR/ONI/TPPI:ASHOWLER(DRAFT)
AID/POL:JHESTER(DRAFT)
AID/AFR/FHA/OFDA:GHUDEN(DRAFT)
AID/ASIA/DR/TR:MKUX(DRAFT)

ROUTINE AIDAF

AIDAC NAIROBI FOR REDSO/ESA; ABIDJAN FOR REDSO/WCA;
NE/ENA

E.O. 12356: N/A

TAGS:

SUBJECT: UPDATE ON A.I.D.-APPROVED LIST OF PESTICIDES FOR LOCUST/GRASSHOPPER CONTROL

1. SUMMARY: AID/AFR/ONI IS IN THE PROCESS OF REFINING THE LIST OF PREFERRED PESTICIDES PRESENTED IN THE 1989 PROGRAMMATIC ENVIRONMENTAL ASSESSMENT (PEA) FOR LOCUST AND GRASSHOPPER CONTROL IN AFRICA AND ASIA. THE INFORMATION IN THIS CABLE UPDATES SIMILAR TABULAR DATA IN THE PEA, AND SUPERCEDES SIMILAR DATA IN A.I.D.'S 'REVIEW OF ENVIRONMENTAL CONCERNS IN A.I.D. PROGRAMS FOR LOCUST AND GRASSHOPPER CONTROL, PUBL. SERIES NO. 91-7'. THE INFORMATION ON PESTICIDES IN THIS CABLE SHOULD BE CONSIDERED TO BE AN AMENDMENT TO THE PEA. THE TABLE LISTING PESTICIDES IN THE ENVIRONMENTAL CONCERNS DOCUMENT WAS ONLY MEANT TO INDICATE PESTICIDES THAT CAN BE PURCHASED WITH A.I.D. FUNDS, BUT IT SHOULD NOT BE CONSIDERED AS GUIDANCE FOR PESTICIDE SELECTION, END SUMMARY.

2. WITH MORE AND MORE INFORMATION ON PESTICIDES BEING GENERATED, AID/AFR FINDS IT NECESSARY TO REFINE ITS LIST OF A.I.D.-APPROVED ANTI-LOCUST/GRASSHOPPER PESTICIDES.

UNCLASSIFIED

UNCLASSIFIED 2

THE FOLLOWING IS AN ALPHABETICAL LISTING OF THE PESTICIDES APPROVED IN THE PEA. THE LIST INCLUDES RELEVANT INFORMATION ON TOXICITY, BIO-ACCUMULATION AND SIGNAL WORDS (TO INDICATE THE RELATIVE TOXICITY OF EACH INSECTICIDE). THIS INFORMATION PROVIDES A SKETCH OF PROPERTIES OF THE A.I.D.-APPROVED ANTI-LOCUST/GRASSHOPPER PESTICIDES. ALL OF THE CHEMICALS LISTED BELOW ARE CURRENTLY REGISTERED EITHER BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) OR ITS EQUIVALENT IN OTHER COUNTRIES FOR LOCUST AND GRASSHOPPER CONTROL.

==		TOXICITY TO						
==		----------						
==		FISH	INVER	BIRD	MAMML	BIOAC	PERS	SIGNW
1.	ACEPHATE	L	L	L	M	L	L	C
2.	BENDIOCARB	M	M	M	M	M	M	W
3.	CARBARYL	L	L	L	L	L-M	L	C
4.	CHLORPYRIFOS	M	H	M	M	M	L	C-W
5.	DIAZINON	M	H	M-H	L	M	M	C-W
6.	FENITROTHION	L	H	H	L	M	L	W
7.	LAMBDA-CYHALOTHRIN	H	H	L	H	H	M	D
8.	MALATHION	L	L	M	L-M	L	L	C
9.	TRALOMETHRIN	H	H	L	L	H	M	D

LEGEND:

NON-TARGET ORGANISMS: FISH, INVERTEBRATES (INCLUDING HONEYBEES), BIRDS, MAMMALS

BIOAC = BIO-ACCUMULATION, PERS = PERSISTENCE,

L = LOW; M = MODERATE; H = HIGH (APPLY TO TOXICITY LEVELS TO NON-TARGET ORGANISMS, BIO-ACCUMULATION AND PERSISTENCE; RELATIVE TOXICITY IS ALSO A FUNCTION OF FORMULATION AND ACTIVE INGREDIENT CONCENTRATION)

SIGNW = SIGNAL WORD: C = CAUTION; W = WARNING; D = DANGER (POISON); (APPLIES TO THE RELATIVE TOXICITY OF PESTICIDES IN ASCENDING ORDER; RELATIVE TOXICITY IS ALSO A FUNCTION OF FORMULATION AND ACTIVE INGREDIENT CONCENTRATION)

ANNEX C. MOZAMBIQUE PESTICIDE-RELATED DOCUMENTS

Annex C.1 "Regulamento sobre Pesticidas" -- Mozambique's Pesticide Legislation.

Annex C.2 List of Pesticides Registered in Mozambique.

Annex C.3 "Guia de Pesticidas Registrados em Moçambique--1993" ("Guide to Pesticides Registered in Mozambique - 1993").

Annex C.4 "Associaçao das Empresas de Agroquimicos de Mocambique" ("Association of Agrochemical Companies of Mozambique"), draft constitution.

Annex C.5 Outline of IPM Seminar Held on August 10, 1993 at the Plant Protection Department (Depto. de Sanidade Vegetal), With List of Problems Faced by Plant Protection Officers in Southern Africa.

Annex C.1 "Regulamento sobre Pesticidas" – Mozambique's Pesticide Legislation

ta-feira, 30 de Setembro de 1987 — I SÉRIE — Número 39

BOLETIM DA REPÚBLICA

PUBLICAÇÃO OFICIAL DA REPÚBLICA POPULAR DE MOCAMBIQUE

PRENSA NACIONAL DE MOÇAMBIQUE

AVISO

...mento e publicar no «Boletim da República» deve ser remetido em ... devidamente autenticada, uma por cada assunto, donde conste, além ... indicações necessárias para esse efeito, o averbamento seguinte, ...ode ser autenticada: Para publicação no «Boletim da República».

SUMÁRIO

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MINISTÉRIOS DA SAÚDE E DA AGRICULTURA

Diploma Ministerial n.º 88/87

de 29 de Julho

Nos termos das disposições conjugadas dos artigos 4 e 20 Decreto n.º 12/82, é aprovado o Regulamento sobre Pes...idas que faz parte integrante do presente diploma minis...rial.

Maputo, 30 de Janeiro de 1986. — O Ministro da Saúde, ...scoal Manuel Mocumbi. — O Ministro da Agricultura, ...ão dos Santos Ferreira.

Regulamento sobre Pesticidas

CAPÍTULO I

Definições

ARTIGO 1

Para efeitos deste regulamento estabelecem-se as seguin...s definições:

Adjuvantes — são substâncias tais como solventes, di...entes, agentes tensio-activos ou ingredientes inertes ou ou...os, incluindo em uma formulação com a finalidade de pos...bilitar a aplicação do ingrediente activo de maneira ...omogénea, segura e eficaz.

Boa prática agrícola — emprego correcto e eficaz de um...esticida, levando em consideração as quantidades mínimas ...ecessárias para alcançar o controlo adequado, e aplicado ...e maneira que os resíduos sejam mínimos do ponto de vista ...oxicológico.

Concentração — é a quantidade do ingrediente activo no

Concentração letal 50 % inalatória (CL 50 inalatória) — é a concentração de uma substância na atmosfera capaz de provocar a morte em 50 % dos animais testados após uma exposição mínima de uma hora.

Contramarca — os números, letras, palavras ou siglas colocadas antes ou após a marca.

Dose — é a quantidade de produto por entidade tratada ou por áreas.

Dose letal 50 % dérmica (DL 50 dérmica) — é a dose única, expressa em miligrama da substância por quilo de peso corpóreo, que provoca a morte em 50 % dos animais testados após contacto com a pele intacta por um período de vinte e quatro horas, estendendo-se o controle durante catorze dias.

Dose letal 50 % oral (DL 50 oral) — é a dose única expressa em miligramas da substância por quilo de peso corpóreo, que provoca a morte de 50 % dos animais em experiência até catorze dias após administração por via oral.

Embalagem — todo o recipiente destinado a acondicionar os pesticidas e seus produtos formulados.

Embalagem externa — embalagem destinada a proteger os recipientes sujeitos a quebra, deformações e a outras avaria durante o transporte.

Ingrediente activo — substância de natureza química ou biológica responsável pela acção pesticida.

Intervalo de segurança — é o intervalo mínimo de tempo entre a data de aplicação do pesticida, segundo a boa prática agrícola e a da colheita ou consumo, garantindo uma residualidade inferior a (LMR) estabelecida por este regulamento.

Limite Estranho de Resíduo (LER) — a concentração máxima de resíduo no pesticida tolera no alimento proveniente de circunstâncias não específicas, expressa em miligramas do resíduo de pesticida por quilo de alimento (mg/kg).

Limite Máximo de Resíduos (LMR) — a concentração máxima do resíduo de um pesticida, legalmente tolerado em um alimento, expresso em miligramas do resíduo do pesticida por quilo de alimento (mg/kg).

Marca — o nome ou a expressão utilizada para identificar comercialmente o pesticida.

Pesticida — substância ou mistura de substâncias de natureza química ou biológica destinadas a controlar qualquer agente patogénico ou outras formas de vida animal ou vegetal prejudiciais à agricultura, pecuária e seus produtos, assim como vectores de agentes patogénicos para o homem e pragas domésticas.

Produto formulado — preparação obtida a partir de produtos técnicos com adição de ingredientes inertes e/ou adjuvantes destinada à aplicação no combate às pragas directamente ou após diluição.

Produto técnico — produto constituído pelo ingrediente activo e impurezas resultantes do processo industrial de fa-

isto — aprovação oficial de um pesticida e a defini-
is condições de sua comercialização e utilização no

iduos de pesticidas — qualquer substância que per-
:e em alimentos e águas destinadas ao consumo hu-
ou animal resultante do emprego de um pesticida, ou
iente de circunstâncias não específicas. Incluem-se
definição derivados específicos como produtos de de-
:ão e conversão, metabolitos e produtos de reacção
leradas de importância toxicológica.
ulo — toda a informação impressa, pintada, gravada
)licada sobre qualquer espécie de embalagem.

CAPÍTULO II

Registo de pesticidas

SECÇÃO I

Competências

ARTIGO 2

das as substâncias com acção pesticida ou reguladoras
escimento vegetal, para serem importadas, produzidas,
:rcializadas e utilizadas no País, serão previamente re-
das pelo Instituto Nacional de Investigação Agronó-
(INIA), do Ministério da Agricultura, a seguir desig-
por Entidade de Registo.

ARTIGO 3

ura a efectuação do registo é necessário o parecer favo-
l do Departamento de Higiene do Ambiente (DHA) do
istério da Saúde, nos termos do n.º 1 do artigo 4 do De-
) n.º 12/82, de 23 de Junho.

ARTIGO 4

avaliação técnica dos pesticidas utilizados na agricul-
, pecuária, saúde pública e uso doméstico é respectiva-
nte da competência do INIA, Instituto Nacional de Ve-
nária (INIV) do Ministério da Agricultura e do DHA
Ministério da Saúde.

SECÇÃO II

Procedimento para obtenção do registo

ARTIGO 5

1. Para obtenção do registo, as entidades interessadas de-
1 entregar à Entidade de Registo acompanhado pelas
ormações sobre o pesticida indicadas no Anexo I ao pre-
nte Regulamento.
2. As informações devem ser entregues em duplicado,
ndo se trate de produtos para a agricultura, e em triplic-
o, no caso de produtos para a pecuária. Na altura do
dido as entidades interessadas devem efectuar o paga-
nto da taxa definida pela Entidade de Registo.
3. O pedido deve ser acompanhado por:

— Fontes de informação comprovativa dos dados apresentados conforme indicado no Anexo I;
— Uma maquete do rótulo proposto, em cinco cópias;
— A maquete ou o texto de qualquer material de publicidade ou informação técnica a ser distribuída sobre o produto, em cinco cópias;
— Um exemplar de cada embalagem proposta;
— Amostras do ingrediente activo, produto técnico e produto formulado.

ARTIGO 6

A Entidade de Registo pode exigir ao requerente quaisquer informações não especificadas no Anexo I que considere indispensável, ou exigir a alteração do rótulo, material de publicidade ou embalagem de pesticidas de modo a cumprir as normas em vigor no País.

ARTIGO 7

A verificação da documentação é da competência da Entidade de Registo. No caso do pedido do requerente estar incompleto, a Entidade de Registo poderá devolvê-lo ao requerente ou solicitar as informações em falta num prazo máximo de trinta dias a partir da data de recepção.

ARTIGO 8

1. Num prazo máximo de trinta dias a partir da data de recebimento do pedido, a Entidade de Registo enviará o processo para parecer do INIV para produtos destinados à pecuária, e ao DHA, a fim de se avaliarem os aspectos toxicológicos e se definirem os limites máximos dos resíduos, conforme o disposto nos n.ºs 3, 4 e 5 do artigo 4 do Decreto n.º 12/82, de 23 de Junho.
2. Os pareceres do INIV e do DHA devem ser enviados à Entidade de Registo num prazo máximo de sessenta dias.
3. A Entidade de Registo procederá ao despacho final num prazo de trinta dias após o recebimento dos pareceres referidos no presente artigo.

ARTIGO 9

O despacho final da Entidade de Registo será comunicado à entidade requerente por escrito e com aviso de recepção, com uma cópia ao Ministério do Comércio. No caso de registo, deve constar no despacho:

— Número de registo;
— Marca e contramarca;
— Ingrediente(s) activo(s);
— Concentração do(s) ingrediente(s) activo(s);
— Categoria do pesticida;
— Formulação;
— Nome e endereço do fabricante;
— Nome e endereço da empresa responsável;
— Classificação toxicológica atribuída;
— Campo de aplicação;
— Limitações.

ARTIGO 10

Qualquer alteração na composição do produto, seu rótulo ou embalagem, ou do endereço do seu fabrico ou formulação, deve ser comunicado imediatamente por escrito à Entidade de Registo, detalhando as mudanças propostas, em duplicado, ou em triplicado no caso de produtos para a pecuária.

A Entidade de Registo pode se assim o entender, exigir um novo processo de registo do pesticida.

SECÇÃO III

Publicação dos pesticidas registados

ARTIGO 11

Uma lista de todos os ingredientes activos e produtos formulados registados será publicada de seis em seis meses no *Boletim da República*, por despacho conjunto dos Minis-

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SECÇÃO IV

'ade do registo e procedimento para a renovação do registo

ARTIGO 12

validade do registo e da renovação do registo é de cinco

ARTIGO 13

registo pode ser renovado por um período de cinco através de um pedido por escrito da entidade titular egisto, entregue à Entidade de Registo. A Entidade de sto pode exigir quaisquer informações que considere ssárias para o processo da renovação do registo, ou r a alteração do seu rótulo, embalagem ou material de icidade, antes de efectuar a renovação do registo.

ARTIGO 14

odos os pesticidas registados no sistema de registo an- ao presente Regulamento devem ser obrigatoriamente tados de novo.

ARTIGO 15

procedimento e as prioridades para a renovação do re- nos termos do presente Regulamento serão fixados Entidade de Registo.

SECÇÃO V

Anulação do registo

ARTIGO 16

Entidade de Registo pode anular o registo de qualquer ida a qualquer momento, com base em novas infor- es recebidas ou por qualquer outro motivo. A proposta nulação do registo será comunicada por carta com aviso cepção à entidade titular do registo, indicando os mo- da anulação. A anulação ficará pendente durante um odo de quarenta e cinco dias a partir da data da recep- do aviso. Durante este período a entidade titular do re- pode reunir os argumentos e informações necessárias justificar a continuação do registo. Estas informações m ser entregues em duplicado, ou em triplicado no de produtos para a pecuária, à Entidade de Registo, tomará uma decisão final no prazo de quinze dias. nulação do registo será publicada no *Boletim da Repú-*

SECÇÃO VI

[redacted]

ARTIGO 17

odos os produtos que não apresentem uma garantia su- nte sobre a eficácia e segurança podem ser registados orma provisória.

ARTIGO 18

[redacted]

SECÇÃO VII

Autorização para o uso experimental de pesticidas

ARTIGO 19

pesticidas destinados à experimentação e não regis- s poderão ser importados através de uma autorização o Uso Experimental de Pesticidas (AUEP).

ARTIGO 20

ra a obtenção da AUEP, as entidades interessadas de- entregar à Entidade de Registo um pedido escrito panhado pelos dados indicados no Anexo II do pre- sente Regulamento. Na altura do pedido as entidades interessadas devem efectuar o pagamento da taxa definida pela Entidade de Registo.

ARTIGO 21

No caso do pedido estar incompleto, a Entidade de Registo pode devolvê-lo ao requerente e/ou solicitar as informações em falta dentro de um prazo de sete dias. Uma vez verificadas as informações apresentadas, a Entidade de Registo procederá ao despacho final num prazo máximo de trinta dias.

ARTIGO 22

A validade da AUEP é de um ano, podendo ser renovada através da apresentação de um pedido escrito acompanhado por um relatório sobre as actividades experimentais desenvolvidas.

ARTIGO 23

1. A AUEP limita a importação e utilização do produto conforme as normas estabelecidas pela Entidade de Registo. Estas normas estão sujeitas a alterações periódicas. O não cumprimento destas normas implica a suspensão imediata da AUEP e o não reconhecimento dos ensaios para efeito do registo do produto em causa.

2. Não é permitida a comercialização e venda de produtos importados ao abrigo de uma AUEP.

SECÇÃO VIII

Material de publicidade

ARTIGO 24

Qualquer material de publicidade ou informação técnica relacionada com pesticidas já registados ou não, deve ser aprovado pela Entidade de Registo antes de ser divulgado. Para o efeito, deve ser entregue um pedido escrito à Entidade de Registo, acompanhado por cinco cópias do material proposto. Todo o material deve estar de acordo com as «Guidelines for Advertising Practice in the Promotion of Pesticide Products in Developing Areas of the World», National Agricultural Chemicals Association, EUA, 1983.

SECÇÃO IX

Confidencialidade

ARTIGO 25

Quando determinadas informações forem consideradas segredos industriais, os requerentes devem assinalá-las expressamente em cada página com a indicação «confidencial». As informações assim indicadas serão tratadas em conformidade com as normas aplicáveis.

CAPÍTULO III

Importação de pesticidas

Registo de importadores

ARTIGO 26

A entidade que pretender realizar a importação de pesticidas, destinadas à produção ou outros usos, qualquer que seja a sua quantidade, deve solicitar o seu registo como importador de Pesticidas à Entidade de Registo, e efectuar o pagamento da taxa definida. Após a Entidade de Registo ter efectuado o registo, será emitido um Certificado de Registo de Importador de Pesticidas.

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SECÇÃO II

Procedimento para importação de pesticidas

ARTIGO 27

entidade importadora deve fornecer, para todos os pes... as a importar, seja qual for o fim, ou a quantidade os... s exigidos pela Entidade de Registo, constantes no Bo... Descritivo para Importação de Pesticidas.

ARTIGO 28

boletim deve ser preenchido em duplicado, e deve ser ...panhado por toda a documentação de importação res... ...va.

ARTIGO 29

...o caso de pesticidas importados em forma comercial, ...-se indicar no boletim o valor total da importação, o ... unitário do produto formulado e da substância activa, ...ando a moeda de pagamento e o valor equivalente em ...cais e em dólares americanos. Não é obrigatório o for... ...mento destes dados nos casos de produtos importados ... fins experimentais (AUEP).

ARTIGO 30

... Entidade de Registo verificará que o produto des... ... no Boletim tem o registo ou AUEP necessário, con... ...ará se as quantidades indicadas no Boletim correspon... com a restante documentação apresentada, e se a res... ...iva taxa foi paga. Feitas estas verificações, a Entidade ...Registo entregará uma cópia assinada e carimbada do ...etim à entidade importadora para permitir que esta pro... ... ao levantamento do produto no porto de entrada. ...outra cópia será arquivada pela Entidade de Registo.

CAPITULO IV

Locais de produção e embalagem de pesticidas

ARTIGO 31

...odos os estabelecimentos de produção, formulação e em... ...gem de pesticidas devem ser autorizados pelo Minis... ...io de Tutela com prévio parecer favorável do Ministério ...Saúde.

ARTIGO 32

1. O pedido da autorização do projecto de construção ou ...daptação e alteração dos estabelecimentos deve ser apre... ...ado ao Ministério de Tutela, devendo este enviar, no ...zo de trinta dias a partir da sua recepção, uma das có... ...s do processo ao DHA.

2. O DHA devolverá a cópia com o seu parecer, no prazo ...vinte dias a partir da data da sua recepção.

ARTIGO 33

1 pedido para aprovação apresentado ao DHA deverá ...ter, além dos documentos e da memória descritiva pre... ...tos pela legislação em vigor sobre o licenciamento técnico ...estabelecimentos industriais e do comércio, os seguintes ...mentos:

— Indicação relativa ao sistema de drenagem dos de... ...jectos e águas residuais e, onde necessário, dos ... meios usados para a depuração das águas;
— A distância das áreas residenciais ou industriais ali... ...mentares;
— Qualificação técnica do responsável do estabeleci...
— Tipo de ingredientes activos ou produtos formulados produzidos ou embalados, com as suas caracteris... ...ticas técnicas;
— Sistema de combate aos incêndios e outras medidas ... de segurança;
— Outras informações exigidas pelos regulamentos es... ...pecíficos.

ARTIGO 34

No espaço de trinta dias após o termo dos prazos referidos no n.º 2 do artigo 32, o Ministério de Tutela procederá ao despacho final para o qual serão tomados em consideração o parecer da autoridade sanitária, os regulamentos vigentes e as particularidades de cada caso.

ARTIGO 35

Quando o processo revelar deficiências, o Ministério de Tutela notificará o requerente para suprir, num prazo a fixar, essas deficiências ou proceder às modificações que forem necessárias, sob pena de não aprovação.

ARTIGO 36

O início do funcionamento ou laboração só poderá fazer-se após despacho final sobre o Auto de Vistoria dado pelo Ministério de Tutela depois de apreciadas as opiniões dos diversos componentes da comissão de vistoria, sendo indispensável o parecer favorável do Ministério da Saúde. A vistoria deve ser executada no prazo máximo de sessenta dias a partir da recepção do pedido.

ARTIGO 37

1. O Ministério de Tutela no despacho final deve indicar:

— Nome ou razão social da entidade autorizada;
— Domicílio ou sede legal;
— Endereço do estabelecimento autorizado;
— Nome do responsável técnico;
— Produtos autorizados;
— Eventuais limitações e condições particulares.

2. A autorização de produção dá direito à comercialização e venda dos produtos.

ARTIGO 38

1. Qualquer alteração, seja no estabelecimento seja na produção, deve ser autorizada pelo Ministério de Tutela dependendo do parecer favorável do Ministério da Saúde.

2. Os estabelecimentos autorizados são sujeitos ao controlo contínuo do Ministério de Tutela e do Ministério da Saúde.

CAPITULO V

Armazenamento de pesticidas

SECÇÃO I

Competências

ARTIGO 39

Todos os estabelecimentos de armazenamento de pesticidas que pertencem a entidades ou empresas distribuidoras e/ou que possuam uma capacidade instalada de armazenamento superior a 5000 m³, devem ser autorizados pela estrutura provincial do Ministério de Tutela com prévio parecer favorável da Direcção Provincial da Saúde (DPS), desde que sejam cumpridos os requisitos fixados na Secção II do ... capítulo.

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ARTIGO 40

dido de autorização para o projecto de construção, ão ou alteração do armazém deve ser apresentado ura provincial do Ministério de Tutela, devendo este o prazo máximo de trinta dias a contar da data de o, cópia do processo à DPS que deverá devolvê-la seu parecer num prazo máximo de trinta dias.

ARTIGO 41

dido deverá conter, além dos documentos e da me- descritiva prevista pela legislação em vigor sobre o amento técnico dos estabelecimentos industriais e do io, os seguintes elementos:

Indicação relativa ao sistema de drenagem dos de- jectos e das águas residuais;
A distância de áreas residenciais ou industriais ali- mentares;
Qualificação técnica do responsável do armazém.

ARTIGO 42

nício do funcionamento só poderá fazer-se após des- final sobre o auto de vistoria dado pela estrutura cial do Ministério de Tutela apreciadas as opiniões versos componentes da comissão de vistoria, sendo ensável o parecer favorável da DPS. A vistoria deve ectuada num prazo máximo de sessenta dias a partir ta de recepção do pedido.

ARTIGO 43

a o despacho final aplica-se o disposto no n.º 1 do ar- 47 do presente regulamento.

SECÇÃO II

Requisitos dos armazéns

ARTIGO 44

armazéns ou depósitos de pesticidas podem ser auto- os conforme o disposto no artigo 39 deste Regulamento do:

a) Projectados ou construídos em local apropriado, em terreno não sujeito a inundações, distantes de cursos de águas naturais ou fontes subterrâneas;
b) Situados a uma distância mínima de cem metros de habitações ou de locais onde são produzidos ali- mentos, rações, ou outros produtos que possam entrar em contacto com pessoas ou animais;
c) Fornecidos de instalações sanitárias funcionantes e adequadas às exigências de higiene e segurança e proporcionais ao número de trabalhadores.

ARTIGO 45

s armazéns ou depósitos de pesticidas devem possuir as acterísticas de boa ventilação, protecção contra a entrada nimais e pessoas, adequado sistema de drenagem e sis- a contra incêndios. O responsável do armazém deve ser oa habilitada e munida de autorização conforme o dis- o do artigo 51 deste regulamento.

ARTIGO 46

é proibido armazenar pesticidas ao ar livre ou em recin- não adequadamente protegidos da água da chuva ou ra- ção solar.

CAPÍTULO VI

Comercialização e venda de pesticidas

ARTIGO 47

1. Todas as entidades estatais, cooperativas e privados que queiram vender, distribuir ou armazenar pesticidas para comercialização devem obter uma autorização emitida pela autoridade sanitária competente, a nível distrital e da cidade.

2. No pedido de autorização dirigido à autoridade sanitária local deverão constar as seguintes informações:

— Nome completo do requerente;
— Endereço do requerente;
— Denominação do estabelecimento comercial e sua localização;
— Classe toxicológica dos produtos mais tóxicos que se pretende comercializar;
— Medidas de segurança das instalações contra incêndios;
— Nome completo e endereço do responsável do local e habilitações técnicas conforme o artigo 51.

ARTIGO 48

No prazo de trinta dias a partir da recepção do pedido de autorização, a entidade sanitária local deverá executar a vistoria dos locais e controlo das habilitações para emissão da autorização para comercialização e venda, onde deverão constar:

— Denominação do estabelecimento comercial e sua localização;
— Nome completo e endereço do responsável do local;
— Classe toxicológica dos produtos autorizados.

ARTIGO 49

A autoridade sanitária local que emitiu a autorização para comércio e venda de pesticidas pode revogar a referida autorização quando faltem os requisitos na base dos quais foi emitida a autorização.

ARTIGO 50

Os pesticidas da classe 1 podem ser vendidos somente a indivíduos munidos de autorização específica emitida pela Direcção Distrital de Agricultura, conforme as disposições estabelecidas no artigo seguinte.

ARTIGO 51

1. A autorização emitida pela Direcção Distrital de Agricultura é concedida a indivíduos maiores de dezoito anos e que possuam como habilitações literárias mínimas a 4.ª classe e tenham sido aprovados numa entrevista de avaliação feita por esta Direcção. Na entrevista o indivíduo deve demonstrar que conhece os perigos ligados à detenção, conservação, manipulação e utilização de pesticidas, uso correcto dos mesmos e medidas de prevenção a serem usadas para o seu emprego correcto do ponto de vista agrícola.

2. Esta autorização habilita o portador à comercialização, transporte e utilização de pesticidas.

3. A autorização deve conter o nome completo, data e local de nascimento, residência e fotografia do requerente. Esta autorização é válida por um período de cinco anos e renovável mediante as mesmas formalidades da obtenção. Desta entrevista de avaliação ficam isentos os agrónomos e técnicos diplomados pelas escolas e institutos agrários.

CAPITULO VII

Transporte de pesticidas

ARTIGO 52

1. Todos os veículos que transportam pesticidas devem ser autorizados para tal. Esta autorização pode ser de natureza temporária ou permanente.
2. O órgão competente para a emissão da autorização é a Direcção Provincial de Transportes e Comunicações que em alguns casos pode delegar em outras autoridades, comandos distritais da Polícia.

ARTIGO 53

A autorização permanente com validade de três anos ou temporária com validade de quinze dias é concedida aos veículos que apresentem os seguintes requisitos:

— Em bom estado e nas condições de segurança definidas pelo Código da Estrada;
— Construídos de modo a haver uma separação física entre o motorista e a carga;
— Fornecidos de uma pá ou outra ferramenta similar para eventuais operações de limpeza;
— Fornecidos de uma lona e cordas de características adequadas para cobrir e amarrar toda a carga;
— Fornecidos de extintor de incêndio;
— Sinalização correspondente ao tipo de produtos que se pretender transportar (tóxico, inflamável ou outros).

ARTIGO 54

O condutor, para além do cumprimento das disposições legais previstas do Código da Estrada deve ser portador da autorização referida no artigo 5 do presente regulamento.

CAPITULO VIII

Rotulagem de pesticidas

ARTIGO 55

1. Todas as substâncias com acção pesticida ou reguladores do crescimento vegetal, para serem importadas, produzidas, comercializadas e utilizadas no País devem ter rótulo de identificação e de informações sobre qualquer embalagem externa conforme o disposto neste capítulo.
2. Todos os rótulos devem ser aprovados pela Entidade de Registo nos termos do Capítulo II do presente regulamento.
3. A aprovação está sujeita à apresentação do rótulo em forma de prova de imprensa.
4. Todos os dizeres do rótulo devem ser redigidos em Língua Portuguesa e facilmente legíveis por pessoa de visão normal.
5. Todas as unidades devem ser exprimidas em sistema métrico.
6. Todo o material usado na confecção do rótulo deve possuir qualidades técnicas adequadas de maneira a ser durável, forte, aderente e resistente aos elementos, atritos, bem como ao material contido na embalagem e a curtas substâncias que poderão vir a entrar em contacto com o rótulo.
7. Os rótulos deverão ser de cor branca, com dizeres em preto contendo nas partes superiores e inferiores faixas conforme as indicações do Anexo III.
8. Só é permitido o uso de letras itálicas em nomes científicos.

ARTIGO 56

As informações obrigatórias constantes do rótulo são constituídas de três corpos:

1) *Identificação do produto* colocada no corpo central;
2) *Instruções de uso* colocadas no corpo direito;
3) *Precauções no manuseamento, sintomas de alarme e primeiros socorros* colocadas no corpo esquerdo.

ARTIGO 57

Na *identificação do produto* devem constar as seguintes informações:

1. Símbolos e avisos correspondentes à classificação toxicológica do produto, devem ser colocados em posição evidente conforme o Anexo IV. Para produtos de classe I e de peso ou volume líquido igual ou superior a 20 (kg) (l), o seu símbolo deve ser aplicado na embalagem de forma repetida para ser visível independentemente da colocação da embalagem.
2. Marca do produto constituída pelas seguintes partes:
   a) Denominação comercial;
   b) Percentagem do ingrediente activo com o respectivo símbolo (%). Para produtos com mais de um ingrediente activo a percentagem representa o total destes;
   c) Código do tipo de formulação conforme o Anexo V.

Não é permitida a utilização de siglas, números ou letras na denominação comercial, a não ser que estas façam parte do nome comum aprovado, do ingrediente activo. A denominação COMBI ou PLUS só podem ser utilizadas quando o produto é constituído por dois ingredientes activo. A denominação MULTI só pode ser utilizada quando o produto é constituído por três ou mais ingredientes activos.

3. Indicação do tipo de produto de acordo com o seu campo de aplicação (herbicida, insecticida, etc.), e uso (só uso em agricultura, veterinária, doméstica, saúde pública) e suas limitações.
4. Indicação obrigatória dos insecticidas organoclorados, organofosforados, carbonatos e piretróides.
5. Substância activa seguida pelos nomes dos ingredientes activos impressos em letras de tamanho igual a um terço da marca usando a designação aprovada pela Direcção Geral da Qualidade de Portugal, junto com a quantidade mínima garantida de cada ingrediente activo presente, exprimida da seguinte forma:
   a) Sólidos, líquidos viscosos, aerosóis e líquidos voláteis: grama por quilograma (g/Kg) ou percentagem (%) por peso;
   b) Outros líquidos: grama por litro (g/l) ou percentagem (%) por peso;
   c) Gases: percentagem (%) por volume.
6. «PODE SER UTILIZADO EXCLUSIVAMENTE POR PESSOAL AUTORIZADO» para produtos de classe I. «MANTER AFASTADO DAS CRIANÇAS» para produtos das classes II e III.
7. Tipo de formulação.
8. Peso ou volume líquido do produto na embalagem.
9. Número de identificação do lote, data de fabricação e prazo de validade com as seguintes indicações: USAR ANTES DE ...
10. Número de registo da Entidade de Registo.

ARTIGO 58

Nas *instruções de uso* deve constar na parte superior do rótulo a seguinte frase «ANTES DE UTILIZAR ESTE PRODUTO, LEIA AS PRECAUÇÕES INDICADAS», e no mínimo as seguintes informações:

1. Para todos os produtos, o texto A constante do Anexo VI.

2. Instruções específicas para cada tipo de formulação, ocionadas de acordo com os textos de E a L indicados, Anexo VI.
3. Culturas e campo de utilização constante no registo
4. Pestes controladas indicadas por nomes comuns ou ntíficos. Os nomes padronizados no País devem ser utili- os obrigatoriamente.
. Doses ou concentrações recomendadas expressas com me a utilização prevista do produto. e a indicação EXCEDER A DOSE RECOMENDADA.
. Equipamento e método de aplicação.
. Número e época (s) de aplicação recomendada(s).
. Intervalo de segurança.
. Incompatibilidade com outros pesticidas ou produtos nforme a utilização prevista do produto.
0. Cuidados necessários para evitar fitoxicidade ou dano ultura e à cultura que se segue na rotação, ou a outros anismos benéficos.

ARTIGO 59

las *Precauções de manuseio, Sintomas de alarme e Primeiros socorros* devem constar no mínimo as seguintes inações:

. Avisos práticos para preparação, mistura, armazena- e eliminação de embalagens de pesticidas de uso inva- do ou excedente.
. As precauções de segurança na manipulação do pro- o conforme o Anexo VII. Estas precauções devem ser itas em letras maiusculas quando indicadas no anexo. a informar sobre a natureza do produto, manipulação so do concentrado e medidas a tomar caso aconteça uma taminação.
. Informações relacionadas com os sintomas, textos es- ais e utilização de antídotos devem ser adicionados para dutos de classe I e outros quando exigidos pela autori- e de registo.

ARTIGO 60

A autoridade do registo pode exigir se assim julgar neces- o, a colocação no rótulo de quaisquer outros símbolos, res e avisos não contemplados neste capítulo.

ARTIGO 61

las embalagens em sacos ou caixas de um quilograma menos, será permitida a apresentação do rótulo em duas tes uma em cada face de maior superfície de embala- , contendo uma delas os dados constantes no artigo 57 ntra os dados constantes nos artigos 58 e 59.

ARTIGO 62

os rótulos pequenos das embalagens de pesticidas líqui- ondo seja impossível referir todas as precauções é obri- rio incluir os dados constantes no artigo 57 e a frase es- em letras maiusculas «VER FOLHETO JUNTO». informações do artigo 58 e 59 devem obrigatoriamente rar no folheto anexo ou sob forma de pestana, consti- do uma extensão do rótulo.

ARTIGO 63

Não é permitida a propaganda de produtos de acção cida que possa enganar o utilizador usando expressões o: «NÃO TÓXICO», «INÓCUO», «INOFENSIVO» ou valente bem como termos de superioridade «O MAIS CTIVO», «CONTROLO MÁXIMO» e termos semel- tes.
Não é permitida a indicação do rótulo de pestes, cul- s ou usos para os quais o produto não foi especifica- te autorizado no processo de registo.

ARTIGO 64

Para os produtos experimentais as informações obrigatórias constantes no rótulo são as seguintes:

1. Marca ou código de produtos.
2. Nome de ingredientes activos, utilizando o nome comum, o código ou a denominação química, e ainda, a quantidade mínima garantida de cada ingrediente activo presente, expressa no seguinte modo:
   a) Sólidos, líquidos viscosos, aerosóis e líquidos voláteis: grama por quilograma (g/kg) ou percentagem (%) por peso;
   b) Outros líquidos: grama por litro (g/l) ou percentagem (%) por peso;
   c) Gases: percentagem (%) por volume.
3. Símbolo correspondente à classificação toxicológica do produto.
4. Em todos os rótulos deve constar a seguinte inscrição: SOMENTE PARA USO EXPERIMENTAL PROIBIDA A COMERCIALIZAÇÃO E VENDA.
5. *Responsável pela experimentação em Moçambique*, com indicação do nome e endereço do registante da AUEP.
6. Nome e endereço do fabricante ou do fornecedor.
7. Recomendações gerais quanto aos primeiros socorros.
8. Textos referentes aos perigos, sintomas de alarme, antídotos e tratamento.

CAPITULO IX

Embalagem

ARTIGO 65

Todas as substâncias com acção pesticida ou reguladoras de crescimento vegetal, para serem importadas, produzidas, comercializadas e utilizadas no País devem ter a embalagem original aprovada pela Entidade de Registo, conforme o disposto neste capítulo. Não é permitida a reembalagem de produtos importados ou produzidos localmente, sem autorização prévia da Entidade de Registo.

ARTIGO 66

Toda a embalagem deve ser constituída de material que não interfira com o produto mantendo inalteradas as propriedades físicas e químicas dos pesticidas e de seus produtos formulados. Toda a embalagem deve ser resistente a todos os choques mecânicos provenientes do transporte normal, manuseio, armazenagem, carga, descarga e empilhamento. O material de embalagem não deve ser afectado por mudanças das condições atmosféricas, como pressão, temperatura e humidade.

ARTIGO 67

As superfícies interna e externa dos recipientes devem ser constituídas ou revestidas de materiais resistentes à corrosão e reacções com o produto por um período equivalente a pelo menos o prazo de validade do conteúdo. A correspondência às características exigidas no § 1 deste artigo deve ser demostrada através de testes específicos com indicação da metodologia utilizada ou referência a métodos internacionais.

ARTIGO 68

Nenhum recipiente deve apresentar ângulos agudos ou projecções bicudas. Tanto as superfícies externas como internas da embalagem não deverão apresentar depressões capazes de reter o produto durante ou após as operações de esvaziamento. As tampas devem apresentar características de resistência mecânica e química iguais às das emba-

agens e não podem, no caso de produtos líquidos, ter um diâmetro superior a 63 mm.

ARTIGO 69

Os pesticidas e seus produtos formulados só podem ser embalados em recipientes limpos e secos, sendo necessária a remoção de qualquer contaminação externa da embalagem, depois do enchimento.

ARTIGO 70

Para os produtos sólidos e líquidos devem ser seguidos os requisitos de embalagem conforme o disposto no artigo seguinte. Estes requisitos podem ser substituídos por outros aconselhados pelo fabricante, quando convenientemente justificados.

ARTIGO 71

As características e tipo das embalagens de pesticidas são seguintes:

1. Produtos sólidos:

1.1. Embalagens pequenas até à capacidade de três quilogramas podem ser constituídas por sacos, caixas, latas e vasilhames de plástico.

1.2. Embalagens grandes com capacidade de 10–25 Kg podem ser constituídas por sacos, tambores de fibra, plástico ou aço, caixas de papelão corrugado e resistente.

1.3. Os sacos devem ser manufacturados com mais de uma camada do material empregue na confecção, sendo a camada interna de um filme de polietileno com espessura mínima de 0,02 mm.

1.4. As latas devem ser manufacturadas com folha-de-flandre compostas por lâmina fina de aço revestida de ambos os lados por uma camada de estanho.

Externamente, quando necessário, pode aplicar-se tinta ou verniz.

1.5. Os tambores de fibra, plástico ou metálicos são de tamanhos padronizados, com revestimentos constituídos por sacos de polietileno, usados para protecção contra a humidade, redução da contaminação do tambor e facilitação da limpeza de forma a poderem ser reutilizados pela firma produtora.

Único. Todos os recipientes devem ser testados em relação à prova de vasamento assim como também as tampas e outros sistemas de fecho.

2. Produtos líquidos:

2.1. Todo o recipiente para produtos líquidos deve ter uma capacidade tal que após o envase apresente um espaço vazio mínimo de cinco por cento.

2.2. Recipientes pequenos com capacidade até cinco litros podem ser constituídos por latas e frascos com gargalos de vidro/plástico.

2.3. Recipientes grandes com capacidade de dez a duzentos litros são geralmente padronizados e constituídos por latas, vasilhames e tambores manufacturados com aço ou plástico.

Único. Os recipientes grandes de plástico manufacturados com polietileno necessitam de uma embalagem externa, geralmente tambores de

CAPÍTULO X

Eliminação de pesticidas

ARTIGO 72

A eliminação de substâncias com acção pesticida ou reguladoras do crescimento vegetal pode ser executada só quando autorizada pelos órgãos competentes do Ministério da Saúde, que definirá os termos em que a autorização será concedida.

ARTIGO 73

São órgãos competentes em relação a quantidade de produtos a serem eliminados:

— As Direcções Distritais de Saúde até 50 kg de produtos;
— As Direcções Provinciais de Saúde até 500 kg de produtos;
— A Direcção Nacional de Saúde para quantidades superiores a 500 kg.

ARTIGO 74

O pedido de autorização deve conter a quantidade de produtos que se pretende eliminar, a discriminação dos formulados ou produtos técnicos, natureza da formulação e causas que determinaram a inutilização dos produtos, local proposto e sistema utilizado para a sua eliminação.

ARTIGO 75

A autoridade sanitária conforme a complexidade dos casos pode remeter a autorização ao órgão directamente superior definido no artigo 73.

ARTIGO 76

Para eliminação de substâncias com acção pesticida podem ser autorizadas áreas permanentes e controladas para servir indústrias ou grandes sistemas de armazenamento. A autorização é da competência da Direcção Nacional de Saúde. A eliminação de substâncias nestas áreas está sujeita a comunicação da lista e quantidade de produtos que se pretendem eliminar.

CAPÍTULO XI

Classificação toxicológica

ARTIGO 77

1. Para os fins do presente regulamento, os pesticidas são classificados na base da toxicidade aguda para o homem ou animais, resultante de uma exposição única ou repetida durante um prazo de tempo relativo.

2. A classificação toxicológica dos pesticidas baseia-se na dose letal 50 % (DL50) por via oral, dérmica ou inalatória.

3. Sempre que o produto represente para o homem um risco maior ao real do que a DL50 indica a classificação deste produto deve ser modificada.

ARTIGO 78

1. Os ingredientes activos e produtos formulados serão classificados em três classes:

— Classe I ..... Altamente tóxicos
— Classe II ..... Moderadamente tóxicos
— Classe III ..... Ligeiramente tóxicos

2. Um resumo de classificação toxicológica consta no

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ARTIGO 79

nquadram-se como pesticidas da classe I:

. Todos os pesticidas que apresentem a DL_{50} oral inferior 0 mg/kg para produtos sólidos e 200 mg/kg para pro-os líquidos e cuja DL_{50} dérmica seja inferior a 100 mg/ para sólidos a 400 mg/kg para líquidos.

Todos os produtos que poderiam ser classificados na se II e III, mas cuja utilização normal pode apresentar alto risco para o homem ou animais.

ARTIGO 80

nquadram-se como pesticidas da classe II:

Todos os pesticidas que apresentem uma DL_{50} oral preendida entre 50 — 500 mg/kg para produtos sólidos 0 — 2000 mg/kg para produtos líquidos. Todos os pes-las cuja DL_{50} dérmica esteja compreendida entre 100 — 000 mg/kg para produtos sólidos e 400 — 4000 mg/kg a líquidos.

Todos os pesticidas que segundo a DL_{50} poderiam ser ificados na classe III, mas cuja utilização normal pode sentar riscos moderados para o homem ou animais.

ARTIGO 81

nquadram-se como pesticidas da classe III, todos os pes-las cuja DL_{50} oral seja superior a 500 mg/kg para pro-os sólidos e superior a 2000 mg/kg para líquidos e os DL_{50} dérmica seja superior a 1000 mg/kg para produ-sólidos e 4000 mg/kg para líquidos.

ARTIGO 82

lo Anexo IX encontra-se a classificação toxicológica dos dutos registados em Moçambique até ao ano de 1983.

CAPITULO XII

Limites máximos de resíduos tolerados em alimentos

ARTIGO 83

ão aprovados os limites máximos de resíduos de subs-cia com acção pesticida ou reguladoras do crescimento tal referidos no Anexo X para os alimentos contempla-no mesmo anexo. Para os alimentos não contemplados são tolerados resíduos. São também aprovados os inter-os de segurança que devem passar entre o último trata-nto e a colheita e, para os produtos alimentares arma-ados, entre o último tratamento e a colocação dos pro-os para consumo. Nos casos em que não é indicado o rvalo de segurança o emprego de pesticidas deve ser tuado conforme as boas práticas agrícolas, deixando in-valos que garantam o respeito do limite máximo de tole-cia.

ARTIGO 84

Os controlos executados para averiguar a observância limites máximos de resíduos tolerados em alimentos fi-los no presente regulamento são efectuados pelos órgãos executam a vigilância higiénico-sanitária sobre a pro-ão e comércio dos produtos alimentares dos Ministérios Agricultura e da Saúde, utilizando as técnicas analíticas poníveis, capazes pela sensibilidade e especificidade de rriguar os limites de tolerância definidos. Todos os dados olhidos no âmbito do controlo devem ser comunicados Direcção Nacional de Saúde.

CAPITULO XIII

Fiscalização e penalidades

ARTIGO 85

Os autos de infracção levantados pelo pessoal técnico de Saúde e Agricultura relativos ao presente regulamento serão enviados pelas Direcções de Cidade, Distritos, ou Províncias à Polícia Popular de Moçambique a fim de servirem de base à organização do respectivo processo criminal.

ARTIGO 86

A infracção ao disposto no artigo 2 e n.º 2 do artigo 23 do presente regulamento determina a imediata selagem e apreensão dos produtos e pena disposta ao abrigo da Lei n.º 8/82, de 23 de Junho.

ARTIGO 87

A abertura de estabelecimento de produção, formulação, embalagem de pesticidas e armazéns contrariando o disposto nos Capítulos IV e V deste regulamento implica o encerramento imediato do estabelecimento e pena disposta ao abrigo da Lei n.º 8/82, de 23 de Junho.

ARTIGO 88

A comercialização ou venda de pesticidas contrária ao disposto no Capítulo VI deste Regulamento implica a imediata apreensão dos produtos e multa de 10 000,00 a 100 000,00 MT.

ARTIGO 89

A violação do disposto no Capítulo VII é punida com multa de 10 000,00 a 50 000,00 MT, independentemente da apreensão do meio de transporte que haja dado origem à infracção, até à obtenção da competente autorização sanitária.

ARTIGO 90

A importação, produção, comercialização ou utilização de pesticidas em violação do disposto nos Capítulos VIII e IX sobre rotulagem e embalagem são punidas com a imediata apreensão dos produtos e multa igual ao triplo do valor económico dos produtos nos casos de importação e produção e multa de 10 000,00 a 100 000,00 MT nos casos de comercialização e utilização.

ARTIGO 91

A eliminação de pesticidas em violação ao disposto no Capítulo X é punida com multa de 10 000,00 a 100 000,00 MT e com pena conforme o disposto na Lei n.º 8/82, de 23 de Junho, se a eliminação for susceptível de prejudicar gravemente a área ou a Saúde das populações.

ARTIGO 92

1. Os alimentos que apresentem no controlo resíduos superiores aos limites máximos tolerados e definidos no Capítulo XII serão apreendidos, não sendo autorizada a sua comercialização. As autoridades sanitárias definirão os meios adequados para reduzir os resíduos antes da sua comercialização ou destino.

2. A comercialização de produtos contaminados com pesticidas susceptíveis de prejudicarem a Saúde do consumidor é punida conforme o disposto na Lei n.º 8/82, de 23 de Junho.

CAPITULO XIV

Disposições finais

ARTIGO 93

A comissão com funções consultivas de carácter permanente nomeada ao abrigo do artigo 21 do Decreto n.º 12/ de 23 de Junho, são atribuídas as seguintes funções:

a) Apoiar a Entidade de Registo na concessão ou recusa de registo de pesticidas, rotulagem, embalagem e propaganda comercial;
b) Ajudar na elaboração de um formulário de pesticidas;
c) Apoiar as entidades importadoras durante o processo de importação de pesticidas;
d) Elaborar nova regulamentação relacionada com pesticidas;
e) Aconselhar sobre a formulação de pesticidas no País;
f) Propor iniciativas relacionadas com pesticidas.

A comissão pode utilizar a consultória de técnicos quadros de entidades estatais e privadas.

ARTIGO 94

O presente regulamento entra imediatamente em vigor.

Na aplicação do presente regulamento, nos casos que liquem alterações das instalações ou equipamento e utição de produtos em depósito, poderão ser fixados prapor acordo com a autoridade sanitária local nunca suores a um ano.

ARTIGO 95

s dúvidas surgidas na aplicação do presente regulamento o resolvidas por despacho conjunto dos Ministros da de e da Agricultura.

ANEXO I

Pedido de registo

Dados gerais:

1. 1. Nome e endereços completos do requerente.
1. 2. Nome e endereços completos do fabricante (no caso do produto técnico) ou do preparador (no caso de produtos formulados).
1. 3. Marca comercial do produto.
1. 4. Categoria do produto (insecticida, herbicida, etc.).
1. 5. Natureza da formulação (indicando o tipo segundo o sistema do código internacional GIFAP (apêndice 1).

Composição do produto formulado:

2. 1. Conteúdo do ingrediente(s) activo(s).
2. 2. Conteúdo do produto técnico.
2. 3. Natureza e conteúdo de principais impurezas.
2. 4. Natureza e conteúdo de adjuvantes.
2. 5. Natureza e conteúdo de componentes inertes.
2. 6. Especificações propostas da FAO/OMS se existem, ou especificações propostas pelo fabricante.

Ingrediente activo:

vo-se apresentar por separado de [illegible] para cada ingrediente o presente ao produto formulado.

3. 1. Identidade do ingrediente activo:

3.1. 1. Nome técnico ou comum proposto ou aceite pelo ISO; outros sinónimos.
3.1. 2. Nome técnico de acordo com a nomenclatura da IUPAC.
3.1. 3. Fórmula estrutural.
3.1. 4. Fórmula empírica e peso molecular.
3.1. 5. Número do código do fabricante.

3. 2. Características físico-químicas do ingrediente activo puro:

3.2. 1. Estado físico, cor, cheiro.
3.2. 2. Ponto de ebulição/fusão/decomposição.
3.2. 3. Pressão do vapor (quando excede 10^{-3} pascal) a uma temperatura especificada.
3.2. 4. Solubilidade em água e solventes orgânicos a uma temperatura especificada.
3.2. 5. Coeficiente de partição entre água e um solvente não miscível especificada (por ex. n-octanol).
3.2. 6. Densidade para produtos líquidos.
3.2. 7. Estabilidade a humidade (por ex. taxa de hidrólise sob condições definidas).
3.2. 8. Estabilidade a luz (por ex. taxa de fotólise sob condições definidas).
3.2. 9. Espectro de absorção por ex. ultravioleta, infravermelho.

3. 3. Informações do produto técnico:

3.3. 1. Nome e endereço do fabricante e endereço(s) onde foi fabricado.
3.3. 2. Estado físico, cor, cheiro.
3.3. 3. Conteúdo máximo e mínimo do ingrediente activo, expresso em peso/peso.
3.3. 4. Natureza e conteúdo máximo e mínimo de isómeros, impureza e outros subsidiários, expresso em peso/peso e/ou peso/vo.
3.3. 5. Especificações da FAO/OMS ou propostas pelo fabricante os pedidos do registo do produtos técnicos devem ainda apresentar os seguintes dados:
3.3. 6. Toor em água.
3.3. 7. Densidade para produtos líquidos.
3.3. 8. Ponto de fusão, para produtos sólidos.
3.3. 9. Estabilidade ao calor, luz, humidade.
3.3.10. Solubilidade nos solventes mais comuns.

3. 4. Informação sobre o registo do ingrediente activo em outros países.

Listar os países em que o ingrediente activo está registado. Dos países confinantes e do país fabricante ou preparador.
Indicar claramente:

— Nome de pelo menos uma marca registada que contenha este ingrediente activo, com o(s) respectivo(s) número(s) de registo, anexando um rótulo aprovado;
— As culturas ou aplicações para que está registado;
— Quaisquer outras restrições sobre a venda ou uso de produtos que contenham este ingrediente o activo.

4) *Características físico-químicas do produto formulado:*

4. 1. Estado físico, cor, cheiro.
4. 2. Acidez/alcalinidade.
4. 3. Ponto de inflamação e outras informações sobre inflamabilidade.
4. 4. Resultados de testes de corrosividade com materiais vulgarmente usados em embalagens e em equipamento de pulverização.
4. 5. Recomendações sobre condições de armazenagem.
4. 6. Incompatibilidade com outros pesticidas, adubos ou tipos de água.
4. 7. Capacidade de tingir pele e roupa.
4. 8. Outras características.
4. 9. Recomendações sobre lavagem do equipamento de pulverização e protecção utilizada.
4.10. Características físicas relacionadas com uso, de acordo com o tipo de formulação, segundo testes standards do CIPAC.

4.10. 1. Pó seco:

a) Passagem em peneira via seco;
b) Mobilidade (Flowability).

4.10.2. Pó molhável, pasta molhável e grânulos dispersíveis em água:

a) Passagem em peneira via húmida;
b) Suspensibilidade após um intervalo;
c) Molhabilidade.

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4.10. 3. Pó solúvel:

a) Solubilidade em água.

4.10. 4. Formulações granulados:

a) Teor do pó.

4.10. 5. Pastilhas fumigantes:

a) Início e duração do desprendimento do gás, em condições determinadas.

4.10. 6. Concentrado para emulsão e óleo emulsionável:

a) Densidade;
b) Estabilidade da emulsão após diluição.

4.10. 7. Solução aquosa concentrada:

a) Densidade;
b) Estabilidade e presença de depósito.

4.10. 8. Solução não aquosa concentrada (inclui preparação oleosa):

a) Densidade;
b) Estabilidade e presença de depósito;
c) Miscibilidade com veículo indicado (água ou outro).

4.10. 9. Suspensão concentrada (inclui «flowable» e suspensão microencapsulada):

a) Densidade;
b) Passagem na peneira via máquina;
c) Estabilidade da suspensão;
d) Quantidade de espuma persistente.

4.10.10. Ultrabaixo volume:

a) Densidade;
b) Viscosidade;
c) Volatilidade do solvente.

4.10.11. Óleo mineral:

a) Densidade;
b) Índice de sulfonação;
c) Viscosidade.

4.11. *Métodos de análise da formulação.*

Características toxicológicas do ingrediente activo e produto formulado:

ncluir dados sobre quaisquer produtos tóxicos que possam ser mados durante a decomposição do produto como resultado do ição, armazenagem, etc.

5.1. Dados experimentais sobre toxicidade para mamíferos:

5.1.1. Dose letal 50 % aguda (DC_{50}) oral e dérmica do produto formulado, mencionando o animal usado para teste. Concentração letal inalatória (CL_{50}) para produtos cujos ingredientes activos actuam sob a forma gasosa.
5.1.2. Efeitos irritantes ou corrosivos na pele e nas mucosas.
5.1.3. Efeitos alergénicos.
5.1.4. Dados sobre toxicidade crónica e subcrónica incluindo:

a) Toxicidade oral de doses repetidas;
b) Efeitos cumulativos;
c) Efeitos neurotóxicos;
d) Efeitos sobre crescimento;
e) Alterações histológicas dos vários órgãos;
f) Efeitos sobre a composição do sangue;
g) Efeitos sobre o sistema enzimático;
h) Efeitos citotóxicos;
i) Efeitos sobre a duração da vida média;
j) Efeitos sobre reprodução, embriotoxidade, teratogenicidade;
l) Efeitos mutagénicos;
m) Efeitos cardinogénicos;
n) Efeitos sinérgicos.

5.1.5. Exaltação de toxicidade de outros produtos.

5.2. Toxicidade no homem:

5.2.1. Avaliação da dose letal.
5.2.2. Observação directa, por ex: casos clínicos.
5.2.3. Informações estatísticas de intoxicações agudas e crónicas.
5.2.4. Sintomatologia e diagnóstico das intoxicações.
5.2.5. Primeiros socorros antídoto e tratamento médico.

5.3. Toxicidade para outros organismos (ver ítem 7.7.):

5.3.1. Toxicidade para peixes.
5.3.2. Toxicidade para Daphnia.
5.3.3. Toxicidade para aves.
5.3.4. Toxicidade para abelhas.
5.3.5. Toxicidade para outros insectos benéficos.
5.3.6. Toxicidade para plantas aquáticas.
5.3.7. Efeitos sobre a fauna e flora do solo.
5.3.8. Efeitos sobre outras espécies de animais e plantas.

6. *Comportamento do pesticida no meio ambiente:*

6.1. Comportamento do pesticida em plantas:

6.1.1. Características do absorção foliar, resistência e recomendações.
6.1.2. Características de absorção pelas raízes ou outras partes de plantas.
6.1.3. Características de translocação.
6.1.4. Metabolismo e principais metabólitos em plantas.
6.1.5. Tempo de degradação média em condições ambientais representativas de Moçambique, intervalo de segurança.

6.2. Comportamento do pesticida em solos:

6.2.1. Características de absorção e lixiviação em diferentes tipos de solo.
6.2.2. Perdas devidas a iotodecomposição e/ou volatilização.
6.2.3. Decomposição por acção microbiana.
6.2.4. Persistência média estimada às dosagens recomendadas em condições do solo e clima representativas do Moçambique.
6.2.5. Metabólitos principais.

6.3. Comportamento do pesticida em água:

6.3.1. Absorção do pesticida na matéria orgânica do fundo em suspensão.
6.3.2. Degradação e principais metabólitos.
6.3.3. Efeitos sobre actividade de degradação bioquímica, por ex: efeitos sobre níveis de oxigénio dissolvido
6.3.4. Persistência média estimada em condições representativas.

6.4. Comportamento do pesticida em produtos armazenados: factores que afectam a acção e persistência do pesticida por ex: humidade, composição de paredes e contentores, modo de arrumação de material, armazenamento, etc.

6.5. Outros dados sobre resíduos:

6.5.1. Níveis de resíduos e degradação nas culturas e nos produtos alimentares em que é proposto usar o pesticida.
6.5.2. Efeitos de cozedura e/ou transformação industrial sobre níveis de resíduos.
6.5.3. Resíduos em produtos de origem animal.
6.5.4. Métodos de análise de resíduos indicando: especificidade, precisão e limites de detecção.

7. *Utilização proposta do produto:*

7.1. Indicação do campo de aplicação do produto.
7.2. Nome(s) científico(s) e comum(s) da praga(s) controlado(s) e grande controlo obtido (*bom, regular e fraco*).
7.3. Duração de protecção ou controlo e influência do clima, solo, estado de desenvolvimento da cultura e praga, e outros factores (ex: no caso de iscas, grau de aceitação da isca pela praga).
7.4. Modo de acção do produto contra a(s) praga(s) por ex: contacto, sistemático, estomacal.
7.5. Incidência de resistência da (s) praga(s); cuidados necessários para evitar desenvolvimento de resistência.

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7.6. Incidência de danos à cultura (fitoxicidade), animal ou produto tratado sintomas de fitoxicidade ou dano (incluir efeitos sobre qualidade do produto colhido, por ex: cor, cheiro, sabor), diferenças de susceptibilidade entre variedades, cuidados necessários para evitar fitoxicidade ou dano. Para herbicidas: mecanismo da selectividade entre culturas e ervas.

7.7. Efeitos colaterais sobre:

7.7.1. Organismos benéficos, por ex: preparadores, parasitas de pragas, bactérias de nodulação além daqueles mencionados no ponto 5.

7.7.2. Culturas adjacentes e culturas que seguem na rotação.

7.8. Métodos de aplicação. Descrição pormenorizada da(s) técnica(s) propostas para aplicação incluindo os seguintes dados:

7.8.1. Equipamento de aplicação (manual, tractor, aérea).
7.8.2. Volume de calda (por ex: litros/ha); diluente normal; necessidade de agitação.
7.8.3. Recomendações sobre o uso de adjuvantes.
7.8.4. Dosagem para os diferentes tipos de aplicação.
7.8.5. Local de aplicação.
7.8.6. Número e época de aplicações.
7.8.7. Comparação do produto para que se solicito registo com um produto *standard*, ou outra prática *standard* para o controlo da(s) mesma(s) praga(s).

8. *Embalagens propostas:*

8.1. Tipos e tamanhos de embalagens.
8.2. Materiais empregados nas embalagens.
8.3. Resultados de testes de corrosão com as embalagens propostas.
8.4. Resultados de testes de estabilidade sob armazenamento nas embalagens, propostas, e prazo de validade do produto.

9. *Rótulos propostos:*

9.1. Texto proposto do(s) rótulo(s).
9.2. Descrição de papel e tintas a serem utilizadas no rótulo, com exemplar possível.
9.3. Resultados de testes de estabilidade do rótulo e resistência a descolagem abrasão, lavagem, etc.

10. *Despejo de pesticida e vasilhames:*

10.1. Despejo do pesticida excedente.
10.2. Despejo de vasilhames incluindo recomendações práticas para a lavagem de resíduos de produto.

11. *Amostras:*

11.1. Amostra do ingrediente activo puro (1,0 g).
11.2. Amostra do produto técnico (10 g).
11.3. Amostra do produto formulado (aproximadamente 500 ml ou 0,5 kg).

ANEXO II

Dados necessários para a solicitação da AUEP (autorização de uso experimental para pesticidas)

A. Dados sobre o pesticida

1. Nome e endereços completos do requerente.
2. Nome e endereços completos do fabricante ou preparador.
3. Marca comercial do produto.
4. Função principal do produto (insecticida, herbicida, etc.).
5. Tipo da formulação (pó molhável, granulado, etc.).
6. Descrição física do produto formulado: estado físico, cor, cheiro.
7. Natureza e concentração de ingrediente(s) activo(s), incluindo:

7.1. Nome técnico ou comum proposto ou aceite pela International Standards Organization (ISO).
7.2. Outros sinónimos.
7.3. Nome químico de acordo com a nomenclatura da International Union of Pesticide Analytical Chemists (IUPAC).
7.4. Número do código do fabricante.
7.5. Conteúdo em peso/peso ou peso/volume.
8. Natureza e concentração de adjuvantes.
9. Inflamabilidade do produto formulado.
10. Corrosividade do produto formulado.
11. DL_{50} oral, dérmica e por inalação do ingrediente activo e/o produto formulado
12. Irritação/corrosão da pele e das mucosas causadas pelo produto
13. Efeitos alérgicos do produto.
14. Sintomatologia e diagnóstico de intoxicações.
15. Primeiros socorros, antídotos e tratamento médico em caso d envenenamento.
16. Tipos e tamanhos de embalagens.
17. Texto do rótulo a ser utilizado (incluir exemplar).
18. Países onde o produto ou ingrediente activo está registado quaisquer limitações sobre o seu uso ou venda em particula nos países confluantes o país do fabricante.

B. Descrição da experimentação proposta

Fornecer informações *separadamente* para cada cultura ou uso

19. Descrição da utilização prevista para o produto que se pretend ensaiar.
20. Nomes científicos e vernaculares de praga(s) que se pretend controlar.
21. Produto *standard* a ser utilizado para comparação.
22. Doses aproximadas a serem ensaiadas.
23. Frequência e épocas de aplicações a serem ensaiadas.
24. Métodos de aplicações propostas.
25. Pormenores dos ensaios propostos: lugares (machambas), tamanhos de talhões, frequência do aplicações, etc.
26. Protocolo do trabalho do investigação.

C. Antecedentes do pedido

a) No caso dum primeiro pedido para uma AUEP, anexar toda a informação disponível sobre a *história* de uso e experimentação do produto em Moçambique, incluindo relatórios completos dos ensaios e demonstrações efectuados. Indicar se o produto já está registado sob o novo sistema do registo para outros usos além daqueles para que solicita a AUEP.

Indicar se o produto já foi importado em escala comercial especificando machambas utilizadoras do produto sempre que possível;

b) No caso de um pedido de renovação da AUEP, anexar um relatório dos ensaios o demonstrações realizados ou iniciados durante o último período abrangido pela AUEP.

ANEXO III

Modelo das faixas dos rótulos

A altura de cada uma das faixas devem ser equivalente a um sétimo da altura útil do rótulo.

As cores das faixas estão relacionadas com a classificação toxicológica do produto, de acordo com a seguinte especificação:

Classe I — cor vermelha.
Classe II — » amarela.
Classe III — » verde.

A faixa superior do rótulo deve conter a marca do produto impressa a branco nos três corpos do rótulo, devendo ocupar um meio da altura da faixa.

A faixa inferior deve conter o nome e endereço do fabricante e do responsável legal pela venda, impressos a branco em letras de altura máxima três milímetros.

Na faixa inferior é autorizada a impressão do emblema a branco e do frase sobre a limitação da responsabilidade da firma produtora.

ANEXO IV

Modelos dos símbolos toxicológicos

Símbolos e avisos correspondentes à classificação toxicológica

1) Os símbolos devem ser em forma de quadrado, dividido em dois triângulos iguais. O triângulo superior deve contar o símbolo correspondente à classe toxicológica do produto, e o triângulo inferior os avisos, conforme os modelos:

CLASSE I CLASSE II CLASSE III

VENENOSO QUANDO COMIDO/BEBIDO

O triângulo superior tem fundo amarelo, contendo uma caveira duas tíbias cruzadas a preto para os símbolos da classe I e II, cruz de Santo André a preto o símbolo da classe III.
O triângulo inferior tem fundo branco, e os avisos indicados modelo a preto, consoante a classe toxicológica do produto.
A largura da orla deve ser 2/50 do lado do quadrado a preto.
Um traço fino deve separar os dois triângulos.
As dimensões dos símbolos toxicológicos no rótulo devem conforme o peso líquido do produto segundo o seguinte quadro:

Peso/volume líquido do produto	Dimensão do lado do quadrado dos símbolos toxicológicos
g ou cm³	cm
1000	2,5
1000-5000	3,5
5000	10,0

ANEXO V

a de tipos de formulações de pesticidas e sistema de código internacional (GIFAP)

Isca de grãos.
Bomba de aerosol.
Ingrediente activo/substância.
Outros líquidos para aplicação directa.
Isca em blocos.
Bloco.
Isca concentrada.
Granulado encapsulado.
Suspensão de capsulado.
Pó.
Pó para tratamento de sementes a seco.
Concentrado para emulsão.
Líquido para pulverização electroestática.
Emulsão (água em óleo).
Emulsão (óleo em água).
Pastilha fumigadora.
Granulado fino (tamanho de partículas: 300 — 2500 mm).
Vela fumigadora.
Cartucho fumigador.
Filamento fumigador.
Concentrado fluído para tratamento de sementes.
Tablete fumigadora.
Produto fumigador.
Grânulo fumigador.
Gás (em embalagem pressurizada).
Isca granulada.
Produto gerador de gás.
Macrogranulado (tamanho de partículas: 2000 — 6000 mm).
Polvilho fino (para estufas).
Granulado.
Pasta oleosa.
Concentrado para nebulização a quente (hot fogging).
Concentrado para nebulização a frio.
Laca.
Solução para tratamento de sementes.
Microgranulado (tamanho de partículas: 100 — 600 um).
Concentrado fluído miscível em óleo.
Solução miscível em óleo.
Pó molhável em óleo (*não* — organophosphorous compunds).
Pasta.
Isca em pires.

PO Solução para molhar (a pele dos animais: *pour-on*).
PR Filamento vegetal (plant rodlet).
PS Semente tratada com pesticida.
RB Isca pronta para usar.
SA Solução para aplicação local (spot application-a pele dos animais)
SB Isca em aparas.
SC Suspensão concentrada (= flowable).
SG Granulado solúvel em água.
SL Concentrado solúvel em água.
SO Óleo para formar película (camada superficial) nas águas.
SP Pó solúvel (em água).
SS Pó solúvel para tratamento de sementes.
SU Suspensão para aplicação em ultra baixo volume (ULV).
TB Tablete.
TC Produto técnico.
TP Pó para despistagem (rodenticida de contacto).
UL Líquido homogénio para aplicação em ultra baixo volume (ULV).
VP Produto produtor de vapor.
WG Granulado para dispersão em água.
WP Pó molhável.
WS Pó para preparação de *slurry* (mistura aquosa).
XX Outros.

ANEXO VI

Directivas para uso

Texto *A:*

1. Este pesticida envenena através da pele.
2. Evite qualquer contacto do produto. Use equipamento de protecção como fato-macaco/luvas/máscara.
3. Não beber, comer ou fumar durante a utilização deste produto.
4. Perigoso para animais e peixes.
5. Guarde todos os pesticidas separados de outros produtos, num armazém próprio fechado à chave.
6. Nunca utilize as embalagens vazias para guardar água ou alimentos.

Texto *B:*

Proteje as mãos e use luvas de borracha.

Texto *C:*

As plantas e produtos tratados com este pesticida são *venenosos* durante X dias depois do tratamento. *Não entre* na machamba durante este período.

Texto *D:*

Mantenha a embalagem *longe do fogo* e na sombra.
Para produtos altamente inflamáveis as palavras «CUIDADO: PEGA FOGO FACILMENTE» e o símbolo de inflamabilidade de tamanho mínimo equivalente a 0,5 % da área total do rótulo.
Para produtos inflamáveis as palavras «CUIDADO NA ARMAZENAGEM: ARDE FACILMENTE» e o símbolo de inflamabilidade de tamanho mínimo equivalente a 0,5 % da área total do rótulo.

Texto *E:*

Evite respirar os produtos pulverizados.

Texto *F:*

Não aplique contra o vento.

Texto *G:*

Este produto liberta gás venenoso em contacto com ácidos e água. ESTE GÁS PODE MATAR.

Texto *H:*

Este produto IRRITA a pele e os olhos.

Texto *I:*

Use uma máscara própria de protecção com filtros novos/Não produto em culturas ou alimentos.

Texto *J:*

Use óculos protectores/Nunca trabalhe sozinho com este produto.
Use uma máscara própria de protecção com filtros novos/Não deixe entrar ninguém no lugar tratado/Feche durante X dias, depois ventile bem o ambiente.

Texto *L*:

e lave a roupa protectora no fim do trabalho.
nca leve para casa.

ANEXO VII

ectivas sobre sintomas de alarme e primeiros socorros

Recomendações gerais quanto a primeiros socorros: Incluir comendações comuns constantes do Apêndice I.
Textos referentes a perigo, sintomas de alarme, antídoto e nento para produtos:

.1 A base de compostos organoclorados: Incluir texto padronizado no Apêndice II.
.2. A base de compostos organofosforados: Incluir texto padronizado no Apêndice III.
.3. A base de composto carbomatos: Incluir texto padronizado no Apêndice IV.
.4. A base de brometo de metil: Incluir texto padronizado no Apêndice V.

Para outros grupos químicos, os textos referentes a perigos, nas de alarme, primeiros socorros, antídotos e tratamentos ão ser apresentados pelos interessados por ocasião do pedido gisto.
Quando devidamente justificados e documentados pelos inte- dos os textos propostos poderão ser parcialmente alterados zo do órgão competente do Ministério da Saúde.

APÊNDICE I

Recomendações comuns para primeiros socorros (para todos os produtos)

caso de contacto do produto com a pele, lave imediatamente muita água. Tira a roupa se estiver suja com pesticida.
o produto atingir os olhos, lave imediatamente com muita durante dez minutos.

Não corrosivo:

o produto foi engolido, faça vomitar imediatamente, dando morna e metendo um dedo na garganta.
petir até que o vómito saia claro.

Corrosivo:

o produto foi engolido, não faça vomitar, beba muita água.
unca faça beber nada a uma pessoa inconsciente:

m caso de envenenamento chame o médico e mostre-lhe este lo.

APÊNDICE II

Compostos organoclorados

Sintomas de alarme:

ores de cabeça, vómitos, tonturas, tremores, convulsões e coma.
ntídoto e tratamento (Informações para médicos):

arbitúricos pelas vias oral, intramuscular ou intravenosa, nos s de excitação do sistema nervoso. Diazepóxidos também são cados. Antibióticos e corticosteróides, na pneumonite química.

APÊNDICE III

Compostos organofosforados

apidamente absorvido através da pele (quando aplicável), vene- *se ingerido, inalado ou absorvido através da pele.*
ão trabalhe com este produto para mais de seis horas por dia, rinta horas por semana. Em caso de ficar mal disposto (Dores abeça, enjoo, fraqueza) pare imediatamente o trabalho, deixa rabalhar com pesticidas durante quinze dias.
o acidentado parar de respirar, aplique imediatamente respi- o artificial.

Sintomas de alarme:

raqueza, dores de cabeça, aperto do peito, visão turva, pupilas reactivas, salivação abundante, suores, náuseas, vómitos, diar- e cólicas abdominais.

Antídotos e tratamento (Informações para médicos):

B-2 atropina, por via intramuscular ou intravenosa (eventualmente também por via oral); 1 a 6 mg cada 5 a 30 minutos, até atropinização leve.
Oximas — Pralidoxima B-9: 1 a 2 g/dia, nos três primeiros dias.
Não usar: morfina Z-47, anunofilina I-2, tranquilizantes.

APÊNDICE IV

Carbomatos

Rapidamente absorvido através da pele (quando aplicável).
Não trabalhe com este produto para mais de seis horas por dia, ou trinta horas por semana, em casos de ficar mal disposto (Dores de cabeça, enjoo, fraqueza) *pare imediatamente o trabalho, deixe de trabalhar com pesticidas durante quinze dias.*

Se o acidentado parar de respirar, aplique imediatamente respiração artificial.

Sintomas de alarme:

Fraqueza, dores de cabeça, aperto no peito, visão turva, pupilas não reactivas, salivação abundante, suores, náuseas, vómitos, diarreia e cólicas abdominais.
Antídoto e tratamento (Informações para médicos):

B-2 Atropina, por via intramuscular ou intravenosa (eventualmente também por via oral); 1 a 6 mg cada 5 a 30 minutos, até atropinização leve.
Não usar: Oximas — pralidoxima B-9, morfim Z-47, aminofilina I-2, tranquilizantes.

APÊNDICE V

Brometo de metilo

Perigo.
Gás venenoso.
Pode matar ou danificar os pulmões.
Não respire vapores.
Use roupa de mangas curtas e não use botas e roupa de borracha.

Sintomas de alarme:

Náuseas e vómitos, dores de cabeça, fadiga excessiva, visão embaraçada, fala incorrecta, convulsões e queimaduras na pele.

Primeiros socorros:

Leve o paciente para o ar fresco.
Assegure-se que o paciente respire livremente; mantenha-o aquecido.

Administre respiração artificial se ocorrer parada respiratória.
Tratamento (Informação para médicos):

No caso de ocorrência de náuseas e vómitos, administre, por via intravenosa; soro glicosado, com objectivo de controlar o vómito e a desidratação até que eliminação de urina volte ao normal. Se o vómito não ceder, administre um narcótico *Metoclopramida (G-15)*. No caso de comprometimento pulmonar mantenha o paciente em atmosfera 100 % oxigénio ou de mistura de oxigénio e CO_2. O médico deve estar preparado para a acorrência do edema pulmonar e pneumonite.
Na ocorrência de parada respiratória aplicar respiração artificial; Mantenha o paciente aquecido, em repouso e sob observação por vinte e quatro a quarenta e oito horas após a remissão dos sintomas.

ANEXO VIII

Classes toxicológicas

Classe	Produtos	DL50 (mg/kg de peso corpóreo) para ratos			
		Por via oral		Por via dérmica	
		Sólidos	Líquidos	Sólidos	Líquidos
I	Altamente tóxicos	< 50	< 200	< 100	< 400
II	Moderadamente tóxicos	50-500	200-2000	100-1000	400-4000
III	Ligeiramente tóxicos	> 500	> 2000	> 1000	> 4000

ANEXO IX

Classificação toxicológica dos produtos registados

Classe I — Produtos altamente tóxicos

Produtos técnicos	Produtos formulados
nfós etílico.	— Azinfós etílico (FW).
C.	— Azinfós etílico (CE).
meto de metilo.	— Dibrometo de etileno (L).
fecloro.	— Paraquat (CE).
bofurão.	— Paratião (QFC).
rfenvinfós.	
rometo de etileno.	
ldrin.	
sulfotão.	
amifós.	
famidão.	
fina e fosfeto de alumínio.	
tato de fenil-mercúrio.	
nocrotofós.	
aquat.	
atião.	
drin.	— Aldrin > 2 % (P).
nacloro.	— Aldrin > 2 % (Gr).
natetralil.	— Aldrin (PM) (CE).
lorvos.	— DHC (PM).
tião.	— Cumacloro > 0,05 % (P).
otenofós.	— Cumatetralil 0,05 % (Gr).
, 5-T.	— Cumatetralil (P).
	— Diclorvos (CE).
	— Endossulfão > 40 % (CE).
	— Fentião > 16,5 % (CE).

Classe II — Produtos moderadamente tóxicos

Produtos técnicos	Produtos formulados
ıcloro.	— Alacloro > 60 % (CE).
ınopol.	— Aldrin < 2 % (P) (Gr).
rbaril.	— Bronopol > 4 % (P).
ınazina.	— Canfecloro (QFO).
rmetrina.	— Carbaril > 15 % (PM).
robenzilato.	— Cianazina > 10 % (SC).
-D.	— Cipermetrina (CE) (ULV).
zomet.	— Clorobenzilato ⩽ 25 % (CE).
T.	— Cumacloro ⩽ 0,05 % (Gr).
ıametrina.	— Cumatetralil ⩽ 0,05 % (Gr).
azinão.	— DDT > 5 % (PM).
metoato.	— Deltametrina (ULV).
xacarb.	— Diazinão > 60 % (Gr).
quat.	— Diazinão > 15 % (CE).
dossulfão.	— Dimetoato > 7,5 % (CE).
itrotião.	— Dinocarp > 50 % (PM).
xim.	— Endossulfão 4-40 % (CE).
inil.	— Fentião ⩽ 16,5 % (CE).
ıdano.	— Lindano < 5 % (CE).
opoxur.	— Propoxur 5 a 50 % (PM).
azaflurão.	— Tiazaflurão > 14 % (PM).
adimefão.	— Triadimefão ⩾ 18,5 % (PM).
adimenol.	
ıcozeb.	— Nitralina.
PA.	— Prometrina (PW).
talaxil.	— Propanil (CE).
MA.	— Propoxur ⩽ 5 % (PM).
tobromurão.	— Tiazaflurão ⩽ 14 % (PM).
tolacloro.	— Triadimefão > 18,5 % (PM).
tribuzina.	— Triclorfão ⩽ 25 % (PS).
ralina.	— Trifluralina (CE).
adiazona.	
icloreto de cobre.	
rmetrina.	
ndimetalina.	
imifós metílico.	
rmetrina.	
opanil.	
piarb.	
iocarbonato.	
razina.	
nefão.	
rbutrina.	
trametrina.	
ofanato metílico	
am.	
clorfão.	
fluralina.	

Classe III — Produtos ligeiramente tóxicos

Produtos técnicos	Produtos formulados
Ácido giberélico	— Ametrina (FW).
Ácido 1-naftil-acético	— Atrazina (PM).
Ametrina.	— Benomil (PM).
Asulam.	— Bromopropilato (CE).
Atrazina.	— Brunopol ⩽ 40 % (P).
Benomil.	— Captafol (FW).
Bromacil.	— Carbaril ⩽ 15 % (PM).
Bromiopropilato.	— Cianazina ⩽ 10 % (SC).
Butacloro.	— DDT ⩽ 5 % (PM).
Captafol.	— Diazinão ⩽ 60 % (Gr).
Captan.	— Diazinão ⩽ 15 % (CE).
Cloridazão.	— Dimetoato ⩽ 7,5 % (CE).
Clorometiurão.	— Dinocap ⩽ 50 % (PM).
Clortal dimetílico.	— Endossulfão ⩽ 4 % (CE).
Difenacum.	— Etidimurão (Gr).
Dipropetrina.	— Etidimurão (PM).
Diurão.	— Fenitrotião (P).
Enxofre.	— Fenitrotião ⩽ 25 % (CE).
Etidimurão.	— Lindano ⩽ 5 % (CE).
Flumeturão.	— Malatião (PM).
Flourodifen.	— Mancozeb (PM).
Glifosato.	— Metobromurão (CE).
Iodofenfós.	— Metolacloro (CE).
Malatião.	— Metribuzina (PM).

ANEXO X

Limites máximos de resíduos tolerados em alimentos

Pesticida	Alimento	Limite máximo de resíduos (mg/kg)		Intervalo de Segurança (dias)
Ácido giberélico *(Giberalic acid)*	Batata	0,05	100	20
Alacloro *(Alachlor)*	Semente de algodão	0,05	T	—
	Cana-de-açúcar	0,01	T	—
	Batata, couves e tomate	N.E.000		—
	Feijão, Milho e Soja	0,02	T	—
Ametrina *(Ametryn)*	Semente de algodão e cana-de-açúcar	N.E.		30
	Ananás	0,2	T	30
Asulam *(Asulam)*	Cana-de-açúcar	0,01	T	7
Atrazina *(Atrazine)*	Ananás e cana-de-açúcar	0,2	T	—
	Milho e sorgo	0,2	T	—
Azinfós-etílico *(Azinphos-ethyl)*	Batata	0,5	T	30
BHC *(HCH)*.	Cajú e milho	N.E.		—
	Carne (na gordura)	0,2	LR[0000 T	—
	Leite e produtos lácteos	0,1	LRE T	—
	Ovos (na gema)	0,2	LRE T	—
Bromacil *(Bromacil)*	Ananás e citrinos	0,1	T	—
Brometo de metilo *(Methyl bromide)*	Grãos armazenados	50		—
Bronopol *(Bronopol)*	Semente de algodão	N.E.		—
Butacloro *(Butachlor)*	Milho	0,1	T	—
Canfecloro *(Camphechlor)*	Carne (na gordura)	7	T	—
Captan *(Captan)*	Algodão e milho	N.E.		15

Pesticida	Alimento	Limite máximo de resíduos (mg/kg)		Intervalo de segurança (dias)
Carbaril (*Carbaryl*)	Arroz	2		7
	Crucíferas	10		7
	Feijão	5		7
	Milho	1		7
	Sorgo	100		7
Carbofurão (*Carbofuran*)	Batata	0,5	T	—
	Milho	0,1	T	—
Cianazina (*Cyanazine*)	Cana-de-açúcar e milho	0,1	T	—
Cipermetrina (*Cypermethin*)	Milho e semente de algodão	0,1	T	—
Clorfenvinfos (*Chlorfenvinphos*)	Batata	0,05		—
2,4-D e seus sais, ésteres e aminas (2,4-D)	Arroz (não beneficiado)	0,2		30
	Trigo (não beneficiado)	0,2		30
	Cana-de-açúcar	2		28

Diazonet (Diazonet)	Resíduos não exubicercidos em razão do plantio ser feito após degradação do produto			
Deltametrina (*Deltamethrin*)	Semente de algodão	0,02	T	—
Diazinão (*Diazinon*)	Batata-doce, feijão, soja e tomate	0,5		15
	Citrinos, crucíferas e milho	0,7		15
	Sorgo	1		15
	Carne (na gordura)	0,7		—
	Leite	0,02		—
Diclorvos (*Dichlorvos*)	Couves, feijão e tomate	0,5		7
	Soja	2		7
Dieldrin (*Dieldrin*)	Batata-doce, cana-de-açúcar, milho, semente de algodão	N. E.		—
Dimetoato (*Dimethoate*)	Batata	0,05		20
	Couves	2		20
	Tomate	1		20
	Trigo	N. E.		20
Dipropetrina (*Dipropetryn*)	Semente de algodão	N. E.		—
Diquat (*Diquat*)	Batata	0,2		30
	Milho	0,1		30
Diurão (*Diuron*)	Ananás e citrinos	—		60
	Cana-de-açúcar	—		60
	Semente de algodão, frutícias	1	T	—
Endossulfão[a] (*Endosulfan*)	Amendoim e feijão	N. E.		25
	Batata e citrinos	1	T	25
	Crucíferas e tomate	2	T	25
	Milho e soja	1	T	25
Enxofre (*Sulfur*)	Caju e maçã	Sem restrições		5
Etidimurão (*Ethidimuron*)	Pastagens	N. E.		—
Fenamifós (*Fenamiphos*)	Tomate	0,2		—

Diazonet (Diazonet)	Resíduos não exubicercidos em razão do plantio ser feito após degradação do produto			
Fenitrotião (*Fenitrothion*)	Cereais e armazenados	10		20
Fentião (*Fenthion*)	Cucurbitáceas	1	T	45
Fluometurão (*Fluometuron*)	Semente de algodão	N. E.		—
Fluorodifen (*Fluorodifen*)	Arroz e soja	N. E.		60
Fosfamidão[b] (*Phosphamidon*)	Batata	0,05	T	20
Fosfina e fosfeto de alumínio (*Phosphine, aluminium phosphide*)	Grãos armazenados	0,1		—
Forim (*Phoxim*)	Grãos armazenados	0,05		42
Ioxinil (*Ioxynil*)	Cana-de-açúcar	0,01	T	30
Lindano (*Lindane*)	Cereais (não beneficiados)	0,5		—
	Leite	0,01		1
Malatião (*Malathion*)	Grãos armazenados	8		—
Mancozeb[c] (*Mancozeb*)	Batata e tomate	0,05 0,01 de ETU[d]		28
MCPA (*MCPA*)	Arroz e trigo	N. E.		20
Metalaxil (*Metalaxyl*)	Milho e tomate	N. E.		—
MSMA (*Methlorsonic acid/sodium salt*)	Cana-de-açúcar e semente de algodão	N. E.		—
Metobromurão (*Metobromuron*)	Feijão, soja e tomate	N. E.		—
Metolacloro (*Metolachlor*)	Semente de algodão	0,05	T	—
Metribuzin (*Metribuzin*)	Batata, soja e cana-de-açúcar	0,1	T	60
	Tomate	N. E.		60
Monocrotofós (*Monocrotophos*)	Batata, milho e óleo de algodão	0,05		30
	Semente de algodão	0,1		30
	Citrinos	0,2		30
Nitralin (*Nitralin*)	Soja	0,1	T	—
	Semente de algodão	N. E.		—
Oxadizona (*Oxadiazon*)	Arroz, cebola e soja	N. E.		—
Triclorfão (*Trichlorfon*)	Milho	0,1		10
	Leite	0,05		—
	Carne de bovino e caprino	0,1		—
Trifluralina (*Trifluralin*)	Batata, couves, tomate, feijão, soja e semente de algodão	0,05	T	—

Observações:

(IXT = Limite de resíduo temporário pelo facto de não ter Ingestão Diária Aceitável (IDA) estabelecida ou a IDA ser estabelecida por um período de tempo limitado.
N. E. = Valores não estabelecidos por falta de dados sobre resíduos.
.RE = Limite de resíduo estranho.

(a) Os limites incluem a soma dos resíduos de Endossulfão A, Endossulfão B e de sulfato de endossulfão.
(b) Os limites incluem a soma dos resíduos dos isómeros *cis e trans* e de seus derivados des-etilados.
(c) Os resíduos são determinados e expressos em C_2S.
(d) Estes dados (ETU) referem-se ao resíduo de etileno-tio-uréia.
(e) Os resíduos referem-se à soma isómeros *cis e trans*.

Preço — 18,00 MT

IMPRENSA NACIONAL DE MOÇAMBIQUE

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Annex C.2 List of Pesticides Registered in Mozambique

TRADE NAME	ACTIVE INGREDIENT	AGENT	REGISTRATION NUMBER	VALIDITY
Actellic 2% Dust	Pirimiphos - Methyl	ICI	IN12/20DP-A	19.09.94
Actellic 50% EC	Pirimiphos - Methyl	ICI	IN12/500EC-A	19.09.94
Aerosol Dragon	Permethrin + Pyrasin forte + Tetramethrin	ICI	IN13+14+15/50AE-A	31.12.94
Alachlor 48% EC	Alachlor	Quimigal	HE7/480EC-B	26.03.95
Alachlor Sentrachem	Alachlor	Sentrachem	HE7/384EC-C	30.05.95
Astra 25% ED	Profenophos	ICI	IN5/250ED-A	30.08.96
Atrazine Sentrachem	Atrazine	Sentrachem	HE4/500FW-A	07.04.94
Azodrin 25% ULV	Monocrotophos	Shell	IN30/250ULV - A	20.03.96
Bac Atrazine 80% FW	Atrazine	S.M.P.A.	HE4/800FW-A	31.07.93
Bac oil	Oil mineral	S.M.P.A.	IN-AC25/85EC-A	29.06.96
Basagran 480 SL	Bentazon	Basf	HE26/480SL-A	25.04.96
Basudine 60% EC	Diazinon	Ciba - Geigy	IN21/600EC-A	30.05.95
Basvitin 50% SC	Carbendazin	Basf	FU14/500SC - A	30.08.96
Baythroid 050 EC	Cyflutryn	S.M.P.A.	IN4/50EC -A	30.08.96
Baythroid 1,2% EC	Cyfluthrin	S.M.P.A.	IN4/12UBV-A	27.02.93
Benlate 50% WP	Benomil	ICI	FU9/500WP - B	30.07.95
Benomil 50% WP	Benomil	Quimigal	FU9/500WP-A	26.03.95
Bladex Plus	Atrazine + Cyanazine	Shell	HE4+15/500SC-A	31.05.94
Bromoxynil + MCPA	Bromoxynil + MCPA	Quimigal	HE25+18/400EC-A	14.12.95
Bronocot 12% DS	Bromopol	ICI	BAC1/120DS-A	26.03.95
Bronocot c 42% DS	Bromopol + Captan	ICI	FU3+4/420DS-A	29.07.93
Butachlor Sentrachem	Butachlor	Sentrachem	HE6/600EC-B	30.08.95
Carbaryl 50% WP	Carbaryl	Quimigal	IN17/500WP-A	26.03.95
Carbofuran 10% Gr	Carbofuran	Quimigal	IN16/100GR-B	15.04.95
Cotogard 500 SC	Fluometuron + Prometrin	Ciba - Geigy	HE12+13/500SC-A	02.05.94
Curacron Ulvair 250	Profenofos	Ciba - Geigy	IN25/250UBV-A	07.04.94
Curacron Ulvair 375	Profenofos	Ciba - Geigy	IN6/375UBV-A	18.10.93
Curaterr 10% Gr	Carbofuran	S.M.P.A.	IN16/100GR-A	15.01.95
Cybush 6% ED	Cypermethrin	ICI	IN3/60ED-A	27.02.93
Cypermethrin 20% EC	Cypermethrin	Quimigal	IN3/200EC-B	26.03.95
Cypermethrin 2,5% ULV	Cypermethrin	Quimigal	IN3/25UBV-B	26.03.95
Decis 0,5% UBV	Deltamethrin	Quimigal	IN11/5UBV-A	15.09.94
Decis 2,5% EC	Deltamethrin	Quimigal	IN11/25EC-A	25.09.94
Diazinon 60% EC	Diazinon	Mitsui	IN21/600EC-B	07.12.95
Dimecron 25% UBV	Phosphamidon	Ciba - Geigy	IN1/250UBV-A	30.09.92
Dimecron 50% Sol	Phosphamidon	Ciba - Geigy	IN1/500SOL-A	30.06.93
Dimepax 500 EC	Dimethenetryn	Ciba - Geigy	HE9/500EC-A	20.02.94
Dipterex 95% SP	Trichlorfon	S.M.P.A.	IN22/950SP-A	30.05.95
Dithane M 45% WP	Mancozeb	S.M.P.A.	FU7/800WP-A	29.06.96
Dithane M - 45	Mancozeb	Mitsui	FU7/450WP-A	07.12.95
Dual 960 EC	Metolachlor	Ciba - Geigy	HE5/960EC-A	07.04.94
Duplosan super	Mecoprob-p + Dichlorprop- p + MCPA	Basf	HE27+28+16/600SL-A	25.04.96
Dursban 24% ULV	Chlorpiriphos	Sentrachem	IN26/240ULV-A	31.07.96
Dursban 4% EC	Chlorpiriphos	Sentrachem	IN26/40EC-A	31.07.96
Endosulfon 25% UBV	Endosulfon	Quimigal	IN7/250UBV-A	11.02.94
Fastac 0,6% UBV	Cypermethrin	Shell	IN3/6UBV-A	30.08.92
Focus ultra	Cicloxidin	Basf	HE24/200ULV-A	25.04.96
Fortrol 5% SC	Cyanazine	Shell	HE15/50SC - A	30.08.96
Fusilad s 12,5% EC	Fluazifop - p - Bothyl	ICI	HE3/125EC-A	27.02.93

Galex 500 EC	Metolachlor + Metobromuron	Ciba - Geigy	HE5+8/500EC-A	07.04.94
Gesagard 500 SC	Promethrin	Ciba - Geigy	HE13/500SC-B	30.05.95
Gesaprim 50% SC	Atrazine	Ciba - Geigy	HE4/500SC-A	19.06.93
Gesaprim 80% PM	Atrazine	Ciba - Geigy	HE4A/800PM-B	19.05.94
Gramoxon Blue 20% Sol	Paraquat	ICI	HE2/200SOL-A	30.08.92
Gramuron Blue 40% SC	Paraquat + Diuron	ICI	HE2A/400SC-A	30.08.92
Guardian 90% EC	Acetochlor	S.H.P.A	HE20/900EC-B	10.04.95
Harness 810 EC	Acetochlor	S.H.P.A.	HE20/810EC-A	10.04.95
Hyvar dupont 80% WP	Bromacil	ICI	HE30/800WP-A	25.04.96
Icon 10% WP	Lambdacyhalothrin	ICI	IN10/100WP-A	19.01.95
Icon 2,5% EC	Lambdacyhalothrin	ICI	IN10/100WP-A	19.01.95
Igran 500 SC	Terbuthrin	Ciba - Geigy	HE14/500SC-A	02.05.94
Igran Combi 500 EC	Terbuthrin + Metolachlor	Ciba - Geigy	HE5+14/500SC-A	02.05.94
Karate 0,8% UBV	Cyhalothrin	ICI	IN10/80UBV-A	28.06.94
Karate 3% ED	Lambdacyhalothrin	ICI	IN10/30ED-A	10.07.94
Karate 5% EC	Lambdacyhalothrin	ICI	IN10/50EC-A	25.08.94
Karate c 1,6% ULV	Cyhalothrin	ICI	IN19/16ULV-A	10.03.95
Klerat (granulado)	Brodifacoum	ICI	RO3/0,5GR - A	05.09.96
Larvin (R) 175 ULV	Thiodicarb	Sapec	IN27/175ULV-A	31.07.96
Larvin (R) 375 SC	Thiodicarb	Sapec	IN27/375SC-A	31.07.96
Lasso 38,4% EC	Alachlor	Shell	HE7/384EC-D	30.05.95
Lasso 38,4% EC	Alachlor	S.H.P.A.	HE7/384EC-A	16.03.94
Lexone du pont 75% WG	Metrebuzin	ICI	HE11/750WG-A	30.04.95
Machete 60% EC	Butachlor	S.H.P.A.	HE6/600EC-A	15.09.93
Malathion 50% EC	Malathion	Quimigal	IN18/500EC-A	26.03.95
Mancozeb 80% PM	Mancozeb	Quimigal	FU7/800PM-A	26.03.95
MCPA 400 EC	MCPA	S.H.P.A.	HE18/400EC-C	29.06.96
MCPA 40% CSA	MCPA	Quimigal	HE18/400SL-A	26.03.95
MCPA Sentrachem	MCPA	Sentrachem	HE18/400EC-A	15.06.95
Metribuzin Sentrachem	Metribuzin	Sentrachem	HE11/480EC-A	07.04.94
Miral 10% Gr	Isazophos	Ciba - Geigy	IN8/100GR-A	19.05.94
Milraz 76% WP	Propineb + Cymoxanil	Ciba - Geigy	FU5+6/760WP-A	20.10.93
Moncerem combi	Pencycuron + Captan	S.H.P.A.	FU12+13/700DS-A	29.06.96
Neoron 500 EC	Bromopropilate	Ciba - Geigy	AC9/500EC-A	07.06.94
Oftanol 50% EC	Isofenphos	S.H.P.A.	IN20/500EC-A	22.05.95
Ordram 6 - E	Molinate	ICI	HE21/60EC-A	15.05.92
Patafol	Ofurace + Mancozeb	Quimigal	FU7+8/700PM-A	07.04.94
Phostoxin Tablets	Aluminium Phosphorete	S.H.P.A.	IN29/560FT - A	30.08.96
Pirimor 12,5% ED	Pirimicarb	ICI	IN31/125ED-A	30.08.96
Pix 0,5% SL	Mepiquatchloride	Basf	HE29/5SL-A	25.04.96
Polytrin 025 ULV	Cypermetrina	Ciba - Geigy	IN3/25ULV-B	08.12.94
Polytrin 200 EC	Cypermetrin	Ciba - Geigy	IN3/200EC-A	07.04.94
Polytrin c 220 UBV	Profenofos + Cypercethrin	Ciba - Geigy	IN3+5/220UBV-A	06.04.94
Polytrin Ulvair 24	Cypercethrin	Ciba - Geigy	IN3/240UBV-C	08.12.94
Pree 40% EC	Metolachlor	Basf	HE5/400EC-A	25.04.96
Primagran 50% SC	Metolachlor + Atrazine	Ciba - Geigy	HE5+4/500SC-B	30.06.93
Primextra 50% SC	Metolachlor + Atrazine	Ciba - Geigy	HE5+4/500SC-A	30.06.93
Prometrin 50% SC	Prometrin	Quimigal	HE13/500SC-A	26.03.95
Propanil 36% EC	Propacil	Quimigal	HE17/360EC-D	15.04.95
Propanil Sentrachem	Propanil	Sentrachem	HE17/360SC-C	30.03.95
Propanil CNPA	Propanil	C.J.F.S.	HE17/350EC-B	25.01.95
Racumin Rat Bait Block	Coumatetralil	S.H.P.A.	RO2/3.33BB - A	30.08.96
Ridomil Combi 50% PM	Metalaxyl + Folpet	Ciba - Geigy	FU1+2/500PM-A	30.07.93

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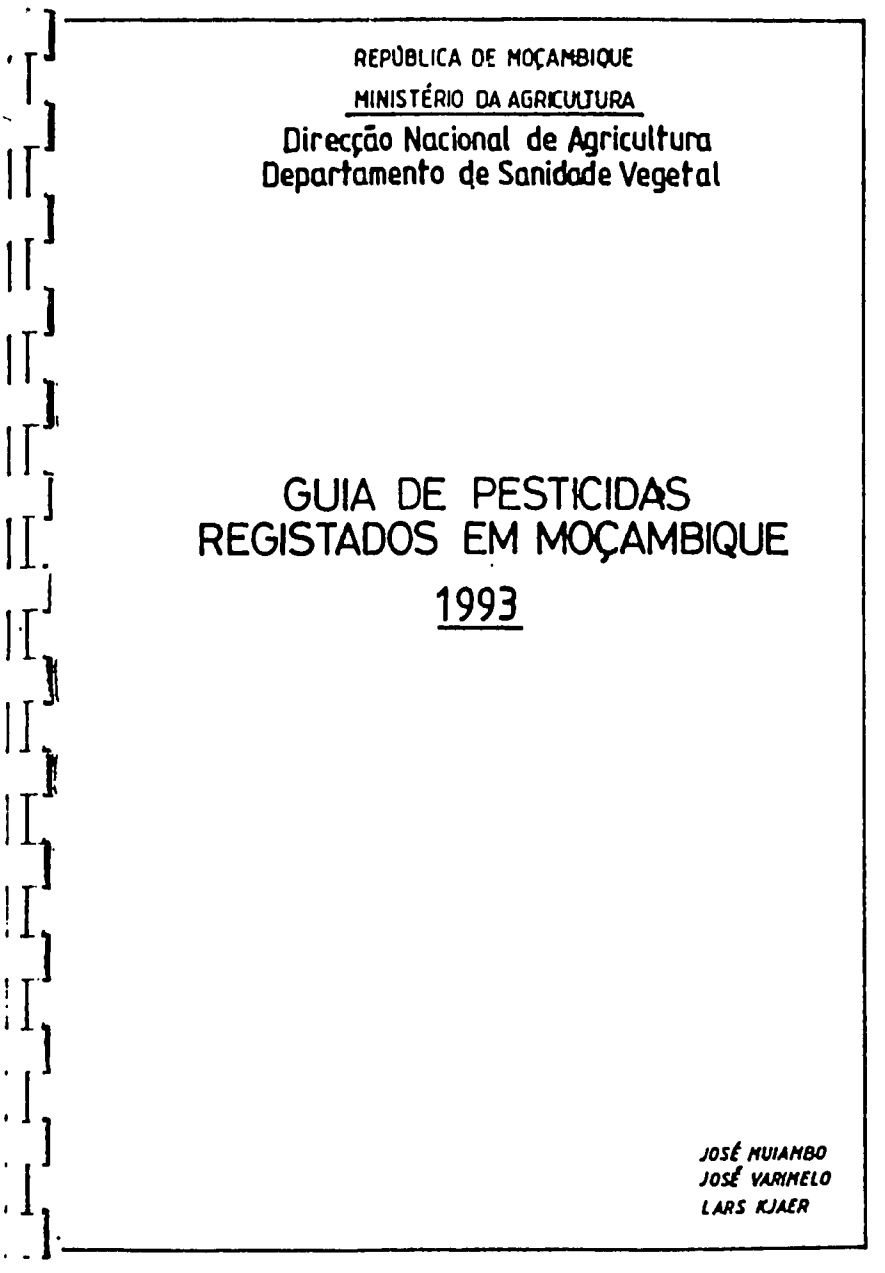
Reastar 25% EC	Oxadiazon	Quimigal	ME16/250EC-A	25.09.94
Roundup	Glyphosate	S.M.P.A.	ME10/480SOL-A	20.02.94
Satanil 60% EC	Thiobencarb + Propanil	S.M.P.A.	ME231+17/600EC-A	29.06.96
Saturn 50% EC	Thiobencarb	S.M.P.A.	ME31/500EC-A	29.06.96
Selecron 500 EC	Profenofos	Ciba - Geigy	IN6/500EC-A	30.05.95
Sencor 70% PM	Metribuzin	S.M.P.A.	ME11/700PM-A	15.01.95
Stam - F - 34	Propanil	Nitsui	ME17/340EC-D	07.12.95
Sting 18% SL	Glifosate	S.M.P.A.	ME18/180SL - A	30.08.96
Stocp 50% EC	Pendisethalin	S.M.P.A.	ME1/500EC-A	30.08.92
Sumi - Alpha 1% ULV	Esfenvalerate	Sumitomo	IN28/10ULV-A	05.07.96
Sumicidin 20% EC	Fenvalerate	Sumitomo	IN2/200EC-A	30.06.93
Sumicidin 3% UBV	Fenvalerate	Sumitomo	IN2/30UBV-A	30.08.92
Sumicidin 4% ULV	Fenvalerate	Sumitomo	IN2/40ULV-A	22.06.96
Sumithion 100% EC	Fenitrothion	Sumitomo	IN5/1000EC-B	18.10.93
Sumithion 2% Dust	Fenitrothion	Sumitomo	IN5/20DP-A	18.10.93
Sumithion 50% EC	Fenitrothion	Sumitomo	IN5/500EC-A	18.10.93
Sumur 80% PM	Sumur	Quimigal	FU10/800PM-A	26.03.95
Supona 30% EC	Chlorfenvinphos	Shell	CA1/300EC -A	31.07.96
Sarcopur 36% EC	Propanil	S.M.P.A.	ME17/360EC-A	18.10.94
Tasaron 58,5% SL	Ketamidephos	S.M.P.A.	IN-AC24/585SL-A	30.07.96
Terbuthrin 50% SC	Terbuthrin	Quimigal	HN14/500SC-B	26.03.95
Trichlorfon 80% SP	Trichlorfon	Quimigal	IN22/800SP-A	14.12.95
Trichlorfon 80% SP	Trichlorfon	Quimigal	IN17/500HP -A	26.03.95
Ustilan 10% Gr	Ethidimuron	S.M.P.A.	ME19/100GR-A	19.04.95
Velpar du pont 90% SP	Hexazinone	ICI	ME22/900SP-A	30.04.95

Jose Rosario
(Pesticides register)

Mozambique August 30. 1991

Fernando do Rosario
(Head of pesticide sector)

Annex C.3 **'Guia de Pesticidas Registrados em Moçambique--1993" ('Guide to Pesticides Registered in Mozambique - 1993')**



REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DA AGRICULTURA

Direcção Nacional de Agricultura
Departamento de Sanidade Vegetal

GUIA DE PESTICIDAS REGISTADOS EM MOÇAMBIQUE

1993

JOSÉ MUIAMBO
JOSÉ VARIMELO
LARS KJAER

INDICE GERAL

INTRODUÇÃO

Pela primeira vez em Moçambique se publica um guia de pesticidas registados e sua utilização O guia contem informações sobre os agroquimicos registados e pretende acompanhar as entidades e personalidades que de qualquer modo estejam envolvidos no trabalho com pesticidas, como sejam agricultores, extensionistas, empresas, escolas, trabalhadores agricolas, escolas, professores e estudantes.

Pode definir-se como sendo pesticidas, toda a substância ou mistura de substâncias de natureza quimica ou biológica, usada no controlo de pestes, na agricultura, pecuaria e saúde pública

Como na maioria dos países em Moçambique existem disposições legais relativas aos pesticidas e assim todos os pesticidas para serem importados, produzidos, comercializados e utilizados no País, devem satisfazer todos os requisitos estabelecidos no Regulamento sobre Pesticidas, aprovado por diploma Ministerial nº 88/87 Entre os requisitos necessários consideram-se importantes os seguintes

-Os pesticidas devem ser registados pela entidade de registo. Antes do registo, os pesticidas devem ser avaliados sob ponto de vista agronómico e toxicológico, como forma de assegurar um bom efeito e evitar riscos para os utilizadores

-Os pesticidas devem ser fornecidos com rótulos em português, aprovados pela entidade de registo, devendo conter toda a informação sobre o uso, segurança e eliminação do pesticida

-Os pesticidas devem ser armazenados e utilizados com a minima poluição do ambiente.

-Os pesticidas devem ser guardados fora do alcance das crianças e de pessoas sem conhecimento sobre pesticidas

Em geral os pesticidas devem ser tratados como substâncias perigosas para o Homem e outros seres vivos bem como para o meio ambiente pelo que devem ser correctamente armazenados, manuseados e utilizados, seguindo-se as normas e cuidados de utilização destes produtos.

Estas palavras pretendem introduzir um pequeno e humilde guia de utilização de pesticidas, nomeadmente os registados, que se pretende seja de utilidades para os seus utilizadores

Marina Pancas
Chefe
Departamento Sanidade Vegetal

• I • R • C
ne Bio-Integral Resource Center
P.O. Box 7414, Berkeley, CA 94707
510/524-2567 • Fax 510/524-1778

FACTS ON BIRC

The Bio Integral Resource Center (BIRC), is a non-profit organization founded in 1978 to offer technical advice and assistance, and publish information on all aspects of environmentally sound pest management. Our publications are written for the general public, and for professionals with responsibilities in or related to pest and resource management.

Programs & Accomplishments. BIRC's technical staff has over 20 years experience in designing and implementing integrated pest management (IPM) programs for public agencies and private businesses in the U.S. and Canada. BIRC's IPM programs invariably produce enhanced pest control with minimal use of toxic materials. For example, the program our staff developed for the National Park Service resulted in a 70% reduction in pesticide use within the first 3 years of implementation. The IPM program developed for city trees in Berkeley, CA reduced pesticide use by over 90% and saved the city $22,500 in the first year of the program. IPM programs developed for citrus orchards cost farmers only $80/acre compared to $120/acre for conventional chemical methods.

Membership Program. Members of BIRC can obtain advice by telephone or mail on the least-toxic methods for solving any pest problem in any location. Through our membership program BIRC has:

- assisted thousands of individuals to reduce use of conventional pesticides in their own homes and gardens, and helped them educate policymakers in their schools, parks, city councils, libraries, and places of work about safe, effective pest control methods.
- familiarized hundreds of professional pest control operators with alternative pest control methods and products, and helped them market these new, less-toxic services to their customers.
- helped farmers, nursery personnel, and public agency resource managers learn about and use cultural, mechanical, biological, and least-toxic chemical pest control methods that substantially reduce or eliminate reliance on toxic materials.
- developed model IPM policy documents used by grassroots organizations to change pest management policy at the state and local level. Developed IPM training manuals and strategy papers under contract to U.S. EPA, U.S. AID, state and local park, water, school and mosquito abatement districts,etc.

Publications. On a monthly basis, BIRC's technical staff scans the world's scientific literature (journals, conference proceedings, government reports, new books, etc.) looking for least-toxic methods of controlling pests in agriculture, urban landscapes and structures, greenhouses, nurseries, forests, rangelands, and in public health and veterinary settings. This information is stored in our in-house database.

non-profit institution providing education and research on integrated pest management.

Promising leads are followed up by interviewing researchers and those using innovative methods and products.

The information obtained during this process is published as technical reports in *The IPM Practitioner*, our international newsletter which surveys the state of the art of integrated pest management (IPM) for BIRC's professional members; and as detailed articles on the control of specific pests in *Common Sense Pest Control Quarterly*, which is written in a less technical form for BIRC's members from the general public.

China Program. BIRC has an active China Program which facilitates communication between scientists and IPM practitioners in the U.S. and the People's Republic of China. The program provides BIRC with information on non-toxic pest control methods and products which have been used for centuries in China, but about which little is known in the West. In return, BIRC provides IPM information to institutions in China seeking to modernize Chinese agriculture with minimal reliance on toxic materials.

International Outreach. With generous support from the Apple Corporation, BIRC is establishing an international computer network of scientific laboratories developing biological controls (natural enemies) of pests. BIRC staff installed a computer at the Chinese Academy of Agricultural Sciences' Biological Control Institute in Beijing, and subsequent links in the network are planned for Africa and Central America in 1993.

Staff. The Executive Director of BIRC is Sheila Daar who holds an M.S. degree in Environmental Horticulture and Ecosystem Management. She has extensive experience in greenhouse, orchard, and landscape pest management, and is a specialist in least-toxic turf and weed management. She is a frequent speaker on practical IPM techniques at training seminars and workshops in the U.S. and abroad, and is co-author with William and Helga Olkowski of*Common Sense Pest Control* (1991 Taunton Press, 715 pp).

The Technical Director of BIRC is William Olkowski, who obtained his Ph.D. in Biological Control. He is an IPM specialist with extensive experience managing urban and agricultural pests. He is recipient of the 1992 "Sustie Award" from the Ecological Farming Conference, and the 1992 Frederick Award for IPM achievements. The computerized IPM databases designed by Dr. Olkowski have been nominated by Apple Computer for the Computerworld/Smithsonian Award.

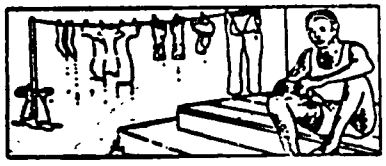
Other members of our 13-member full and part-time staff have backgrounds in entomology, plant pathology, environmental chemistry, agriculture, horticulture, journalism and graphics.

Board of Directors and Advisory Board. BIRC is governed by a seven-member Board of Directors, has an international advisory board of 18 distinguished scientists and pest control industry personnel, and also enjoys relationships with an international network of grassroots organizations working to reduce reliance on toxic materials.

Facilities. Our offices and laboratories are located in Berkeley, CA. BIRC maintains a 12,000 volume English and Chinese language pest management library; a well-equipped laboratory for insect identification and rearing of beneficial insects; a system of computerized databases; and complete desktop publishing facilities. BIRC's 60-acre field station in Winters, CA is under development as a sustainable farm demonstrating resource-conserving technologies and is the site of applied integrated systems research.

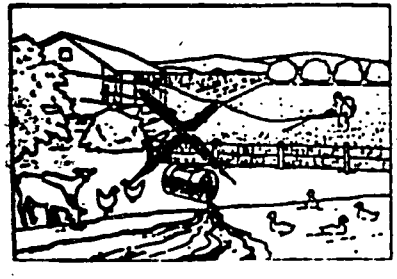
Financial Support. BIRC is supported by memberships, donations, consulting contracts, and grants from foundations, businesses, and public agencies including: The C.S. Fund, Ohrbach Foundation, Rockefeller Family & Assoc., San Francisco Foundation, Shalan Foundation, Strong Foundation for the Environment, Apple Corp., Biosys, Inc., Ringer, Inc., Sandoz Crop Protection, Grace/Sierra, U.S. EPA, and Univ. of California Sustainable Agriculture Program.

NÃO FUMAR, COMER OU BEBER
Durante e após manuseio do pesticida, lavar sempre as mãos e a cara com água e sabão, antes de fumar, comer ou beber.



LAVAR A ROUPA E TOMAR BANHO DEPOIS DE APLICAR UM PESTICIDA
Roupas usadas durante a aplicação contêm pesticida que pode atingir a pele. Para evitar envenenamentolave a roupa e tome banho com água e sabão.

MANTER OS PESTICIDAS AFASTADO DAS CRIANÇAS
Crianças não sabem que os pesticidas são perigosos. Para evitar acidentes, mantenha os pesticidas e o equipamento afastados.



NÃO CONTAMINAR RIOS, POÇOS E LAGOS COM PESTICIDAS
O pesticida pode contaminar a água e torna-la imprópria para o consumo.
O pesticida pode matar o gado e outros animais.

FORMULAÇÕES

Os pesticidas contem um ou vários ingredientes activos, (substância activa) que são a parte que tem certo efeito contra as pestes, (pragas e doenças) Mas eles também contêm ingredientes inactivos tais como solventes, impurezas, aderentes e matérias inertes no caso de pós e granulados. Desomina-se produto formulado ao conjunto dos ingredientes activos e inactivos que constituem o pesticida. A formulação de um produto é a forma de como o produto está formulado, também se designa por formulação o acto de misturar os ingredientes no processamento do pesticida. A formulação do produto depende da natureza do ingrediente activo e do modo de utilização requerida do produto. As diferentes formulações foram dadas um código internacional através do GIFAP. Estes códigos traduzidos em português são dados na tabela abaixo.

OS TIPOS MAIS VULGARES DE FORMULAÇÕES E SISTEMAS DE CODIGO.

Código GIFAP	Descrição	Código português
AB	Isco de grão	is
AE	Bomba de aerosol	aer
BB	Isco em blocos	is
CB	Isco concentrado	is
DP	Pó pulvilhável	pó
DS	Pó para tratamento de sementes á seco	pó
EC	Concentrado para emulsão	cpe
ED	Líquido para pulverização electrostática	
FS	Líquido para tratar sementes	
FU	Produto fumigador	if, sf
GB	Isco granulado	is
GR	Granulado	gr
PO	Produto para molhar pele dos animais	
RB	Isco pronto para usar	is
SC	Suspensão concentrada	spa
SD	Pó para tratamento de sementes com água	
SG	Granulado solúvel em água	gr
SL	Concentrado solúvel em água	sla
SP	Pó solúvel em água	ps
TP	Pó para despistagem (raticida de contacto)	
UL	Líquido para aplicação em ultra baixo volume	ubv,ulv
WG	Granulado para dispersão em água	gr
WP	Pó molhável	pm
WS	Pó para uma mistura aquosa para sementes	pó

TOXICIDADE

Com base nos dados sobre a toxicologia os pesticidas são agrupados em diferentes classes toxicológicas. Normalmente usam-se valores de LD50, que expressa a toxicidade aguda usualmente para ratos. Na base desta informação os pesticidas são divididos em três classes como mencionadas:

CLASSE I. ALTAMENTE TÓXICO.
Pesticidas desta classe são muito tóxicos e só podem ser utilizados por pessoal autorizado depois de para o efeito, terem sido formados.

CLASSE II. MODERADAMENTE TÓXICO.
Pesticidas desta classe ainda representam um perigo para o utilizador, mas podem, com certo cuidado, ser utilizados mesmo no sector familiar.

CLASSE III. LIGEIRAMENTE TÓXICO.
Pesticidas desta classe representam um certo perigo para o utilizador, mas são menos perigosos do que pesticidas das classes I e II.

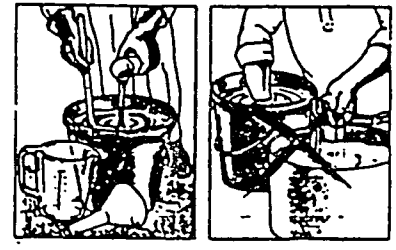
Segurança no uso dos pesticidas

Todos os pesticidas são considerados venenosos e devem ser usados com cuidado No rótulo de cada embalagem estão registados os mínimos cuidados a ter no uso de cada pesticida.

LER ANTES E SEMPRE O RÓTULO DE CADA PESTICIDA

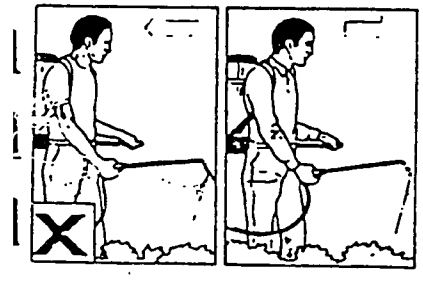
Para a maioria dos pesticidas e de modo geral é suficiente seguir as normas abaixo mencionadas.

NORMAS DE UTILIZAÇÃO DE PESTICIDAS



USAR SEMPRE LUVAS DE BORRACHA
Evitar o contacto com o produto ao medir, deluir e aplicar um pesticida. Se não tiver luvas, pode usar sacos plásticos durante o processo da diluição para proteger as mãos. Lavar sempre e imediatamente as mãos depois do contacto com o produto.

USAR ROUPA DE PROTECÇÃO
Ao aplicar o produto das classes I e II usar roupa de protecção que cobre todo o corpo (luvas, fato macaco e botas) para evitar o contacto com o produto.



NÃO APLICAR CONTRA O VENTO
Ter cuidado com a direcção do vento para evitar que o produto atinja o aplicador. Evitar também passar na área tratada.

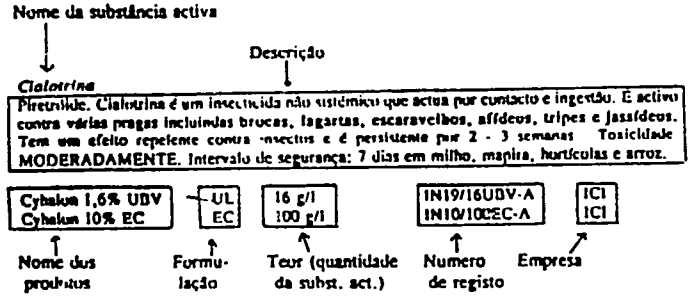
CATEGORIA DE PESTICIDAS

De acordo com a finalidade no uso do pesticida este pode ser classificado segundo várias categorias. Contudo os nomes não restrigem apenas as pestes que eles podem controlar. Por exemplo, um insecticida não controla todos os insectos, e pode ao mesmo tempo ser activo contra outras pragas como ácaros.

São as seguintes as categorias dos pesticidas:

Categoria	Praga e/ou doença controlada
Insecticida	Insectos, por exemplo lagartas, gafanhotos, afídios.
Acaricida	Ácaros, por exemplo ácaro vermelho, ác. branco.
Fungicida	Doenças causadas por fungos, por exemplo míldio, oídio.
Herbicida	Ervas daninhas "infestantes".
Rodenticida	Roedores, por exemplo ratos de campo.
Avicidas	Pássaros. Pássaro de bico vermelho (Pardal).
Carricicida	Pestes de animais domésticos, por exemplo carraças
Nematocida	Nemátodes, por exemplo meloidogyne.
Bactericida	Bactérias, por exemplo Xantomonas no Algodão.

Como ler o guia



Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

INSECTICIDAS

Alfametrina
Piretróide. Alfametrina é um insecticida não sistémico que actua por contacto e ingestão. É activo contra brocas, lagartas, escaravelhos, afídeos, tripes e gafanhotos. Tem um efeito repelente para insectos e é persistente por 2 - 3 semanas Toxicidade: MODERADAMENTE Intervalo de segurança: 14 dias em milho, 7 dias em amendoim, citrinos e feijões e 4 dias em tomate e hortícolas.

Alpha 008 ULV	UL	8 g/l	IN36/ULV-A	Shell
Fastac 0,6% UBV	UL	6 g/l	IN3/6UBV-A	Shell
Fastac 10EC	EC	100 g/l	IN36/100EC-A	Shell

Carbofurão
Carbamato. Carbofurão é um insecticida e nematocida sistémico, que actua por contacto e ingestão. É activo contra várias pragas do solo incluindo nematodos e roscas, e contra insectos sugadores como Jassídeos (vectores do listrado do milho). Aplicar carbofurão em faixas, nos covachos ou incorporar no solo. Carbofurão está registado para uso durante a sementeira Toxicidade: ALTAMENTE. Intervalo de segurança: 60 dias.

Carbofurão 10% GR	GR	10%	IN15/100GR-B	Quimigal
Curaterr 10 GR	GR	10%	IN15/100GR-A	Agriquímicos

Cialotrina
Piretróide. Cialotrina é um insecticida não sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, escaravelhos, afídeos, tripes e jassídeos Tem um efeito repelente contra insectos e é persistente por 2 - 3 semanas. Toxicidade: MODERADAMENTE. Intervalo de segurança: 7 dias em milho, mapira, hortícolas e arroz.

Cyhalon 1,6% UBV	UL	16 g/l	IN19/16UBV-A	ICI
Cyhalon 10% EC	EC	100 g/l	IN10/100EC-A	ICI

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Ciflutrina
Piretróide. Ciflutrina é um insecticida não sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, tripes, percevejos e jassídeos. É também activo contra pragas domésticas. Tem um efeito repelente para insectos e é persistente por 2 - 3 semanas. Toxicidade: MODERADAMENTE. Intervalo de segurança: 35 dias em mapira, 14 dias em milho e tomate.

Baytroid 05 EC	EC	50 g/l	IN4/50EC-A	Agroquimicos

Cipermetrina
Piretróide. Cipermetrina é um insecticida não sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, afídeos, tripes e jassídeos. Tem um efeito repelente contra insectos e é persistente por 2 - 3 semanas. Toxicidade: MODERADAMENTE. Intervalo de segurança: 14 dias em milho, 7 dias em amendoim e feijões e 4 dias em hortícolas.

Cipermetrina 2,5% UBV	UL	25 g/l	IN3/25UBV-B	Quimigal
Cipermetrina 20% EC	EC	200 g/l	IN3/200EC-B	Quimigal
Cymbush 2,5% UBV	UL	25 g/l	IN3/25UBV-A	ICI
Cymbush 25 EC	EC	250 g/l	IN3/250EC-D	ICI
Polytrin 025 UBV	UL	250 g/l	IN3/250UBV-B	Ciba-Geigy
Polytrin Ulvair 24	UL	240 g/l	IN3/240UBV-C	Ciba-Geigy
Polytrin c 200 EC	EC	200g/l	IN3/200EC-A	Ciba-Geigy
Ripcord 2,5 ULV	UL	25 g/l	IN3/25EC-C	Shell
Ripcord 20% EC	EC	200 g/l	IN3/200EC-C	Shell

Clorpirifos
Organofosforado. Clorpirifos é um insecticida não sistémico que actua por contacto, ingestão e fumigação. É activo contra termites, brocas, roscas, escaravelhos e outros insectos no solo os nas folhas. Toxicidade: MODERADAMENTE. Intervalo de segurança: 30 dias em milho e arroz.

Dursban 24 ULV	UL	240 g/l	IN26/240UBV-A	Sentrachem
Dursban 48 EC	EC	480 g/l	IN26/480EC-A	Sentrachem
Pirinex 48% EC	EC	480 g/l	IN26/480EC-B	Enacomo

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Deltametrina
Piretróide. Deltametrina é um insecticida não sistémico, que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, escaravelhos, afídeos, gafanhotos, percevejos e mosca branca. Tem um efeito repelente para insectos e é persistente por 2 - 3 semanas. Toxicidade: MODERADAMENTE. Intervalo de segurança: 14 dias em batateira e 2 dias em cebola e milho.

Decis 0,5% UBV	UL	5 g/l	IN11/5UBV-A	Quimigal
Decis 2,5% EC	EC	25 g/l	IN11/25EC-A	Quimigal

Demeton-S-metilo
Organofosforado. Demeton-S-metilo é um insecticida sistémico, que actua por contacto e ingestão. É activo contra ácaros, afídeos, jassídeos e mosca branca. Toxicidade ALTAMENTE. Intervalo de segurança: 21 dias em batateiras, mapira e tomate e 14 dias em hortícolas.

Metasystox i 25	EC	250 g/l	IN46/250EC-A	Agroquímicos

Diazinão
Organofosforado. Diazinão é um insecticida não sistémico, que actua por contacto, ingestão e fumigação. É activo contra várias pragas incluindo brocas, lagartas, roscas, escaravelhos, afídeos, tripes, percevejos e cochonilhas. Toxicidade: MODERADAMENTE. Intervalo de segurança: 21 dias em citrinos e 15 dias em milho, arroz, mapira e hortícolas.

Basudine 60% EC	EC	600 g/l	IN21/600EC-A	Ciba-Geigy
Diazinão 60% EC	EC	600 g/l	IN21/600EC-B	Mitsui
Diazinão Sentrachem 60 EC	EC	600 g/l	IN21/600EC C	Sentrachem

Diafentiurão
Tioureia. Diafentiurão é um insecticida pouco sistémico, que actua por contacto, ingestão e fumigação. É activo contra afídeos, ácaros, lagartas e jassídeos. Toxicidade MODERADAMENTE. Intervalo de segurança: 14 dias em algodão

Polo 500 SC	SC	500 g/l	IN/AC39/500SC-A	Ciba-Geigy

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Dimetoata
Organofosforado. Dimetoata é um insecticida sistémico, que actua por contacto e ingestao. É activo contra varias pragas sugadores incluindo afídeos, lagartas, tripes e ácaros. Toxicidade: MODERADAMENTE. Intervalo de segurança: 14 dias em algodão.

Perfektion 40 EC	EC	400 g/l	IN/AC45/400EC-A	Agroquímicos

Endossulfão
Organoclorado. Endosulfão é um insecticida não sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, roscas, escaravelhos, afídeos, tripes, jassídeos e ácaro branco. Toxicidade: ALTAMENTE. Intervalo de segurança: 15 dias em algodão.

Endossulfão 25% UBV	UL	250 g/l	IN7/250UBV-A	Quimigal
Thionex 25% UBV	UL	250 g/l	IN7/250UBV-B	Enacomo

Esfenvalerato
Piretróide. Esfenvalerato é um insecticida não sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, escaravelhos, afídeos, tripes, ácaros e gafanhotos. Tem um efeito repelente contra insectos e é persistente por 2-3 semanas. Toxicidade: MODERADAMENTE. Intervalo de segurança: 7 dias em algodão.

Sumi-alpha 1 UBV	UL	10 g/l	IN28/10ULV-A	Sumitomo

Etofenprox
Desconhecido. Etofenprox é um insecticida não sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, escaravelhos, afídeos, tripes, jassídeos e gafanhotos. Toxicidade: LIGEIRAMENTE. Intervalo de segurança 7-10 dias em arroz, milho e hortícolas.

Trebon 10% EC	EC	100 g/l	IN43/100EC-A	Mitsui

Marca do produto	Formulação	Teor em substância activa	Nº do registo	Empresa

Fenitrotião
Organofosforado. Fenitrotião é um insecticida não sistémico que actua por contacto, ingestão e fumigação. Controla lagartas, afídeos, tripes, insectos sugadores e mastigadores em geral. Toxicidade: MODERADAMENTE. Intervalo de segurança: 14 dias em arroz, milho e trigo.

Sumithion 100 EC	EC	1000 g/l	IN5/1000EC-B	Sumitomo
Sumithion 2% Dust	DP	2%	IN5/20DP-A	Sumitomo
Sumithion 50% EC	EC	500 g/l	IN5/500EC-A	Sumitomo

Fenvalerato
Piretróide. Fenvalerato é um insecticida não sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, escaravelhos, afídeos, tripes e gafanhotos. Tem um efeito repelente contra insectos e é persistente por 2 - 3 semanas. Toxicidade MODERADAMENTE. Intervalo de segurança: 7 dias em tomate, hortícolas e milho.

Sumicidin 20 EC	EC	200 g/l	IN2/200EC-A	Sumitomo
Sumicidin 4% UBV	UL	40 g/l	IN2/40UBV-A	Sumitomo

Fosfamidão
Organofosforado. Fosfamidão é um insecticida sistémico que actua por ingestão. É activo contra lagartas, percevejos, mosca branca e afídeos e outros insectos sugadores. Toxicidade ALTAMENTE. Intervalo de segurança: 21 dias em arroz e 14 dias em trigo.

Dimecron 50% SL	SL	500 g/l	IN1/500SL-A	Ciba Geigy

Fosforeto de alumínio
Inorgânico com Alumínio. Fosforeto de alumínio é um fumigante usado na agricultura para o combate aos insectos em armazens à granel de grãos e oleaginosas. Mata todos os animais vivos mas não tem efeito protectora. Toxicidade: ALTAMENTE. Intervalo de segurança: NS aplicável.

Phostoxin 56% FT	FT	56%	IN29/560FT-A	Agroquímicos

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Isazofos
Organofosforado. Isazofos é um insecticida e nematocida sistémico que actua por contacto e ingestão. É activo contra insectos do solo, insectos sugadores e contra nemátodos. O Isazofos deve ser aplicado no solo antes ou durante a sementeira. Toxicidade: MODERADAMENTE. Intervalo de segurança : Não aplicável.

Miral 10% GR	GR	10%	IN8/100GR-A	Ciba-Geigy

Isofenofos
Organofosforado. Isofenofos é um insecticida pouco sistémico. Actua por contacto e ingestão. É activo contra tripes dos citrinos. Toxicidade: ALTAMENTE. Intervalo de segurança: 42 dias em citrinos.

Oftanol 50% EC	EC	500 g/l	IN20/500EC-A	Agroquímicos

Lambda-cialotrina
Piretróide. Lambda-cialotrina é um insecticida não sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo brocas, lagartas, escaravelhos, afídeos, tripes, ácaros e jassídeos. É também activo contra pragas domésticas. O Icon está registado para uso na saúde pública. Toxicidade: MODERADAMENTE. Intervalo de segurança: 7 dias.

Icon 10 WP	WP	10%	IN10/100WP-A	ICI
Icon 2,5 EC	EC	25 g/l	IN10/25EC-A	ICI
Karate 0.8 UBV	UL	8 g/l	IN10/8UBV-A	ICI
Karate 3% ED	ED	30 g/l	IN10/30DP-A	ICI
Karate 5% EC	EC	50 g/l	IN10/50EC-A	ICI

Malatião
Organofosforado. Malatião é um insecticida não sistémico que actua por contacto, ingestão e fumigação. É activo contra várias pragas incluindo lagartas, moscas, ácaro vermelho, escaravelhos afídeos, tripes e cochonilhas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 1 dia em tomate e 7 dias em outras culturas.

Malatião 50% EC	EC	500 g/l	IN18/500EC-A	Quimigal

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Metamidofos
Organofosforados. Metamidofos é um insecticida/acaricida sistémico que actua por contacto e ingestão. É activo contra várias pragas incluindo ácaros, lagartas, afídeos, roscas e tripes. Toxicidade: ALTAMENTE. Intervalo de segurança: 21 dias em crucíferas e tomate e 14 dias em batatas.

Tamaron 58,5% EC	EC	585 g/l	IN/AC24/585EC-A	Agroquímicos

Metidatião
Organofosforado. Metidatião é um insecticida/acaricida não sistémico que actua por contacto e ingestão. É activo contra ácaros, cochonilhas e também contra contra sugadores como afídeos Toxicidade: ALTAMENTE. Intervalo de segurança: 21 dias em citrinos, batateira e hortícolas

Suprathion 40% EC	EC	400 g/l	IN37/400EC-A	Enacomo
Ultracide 40% EC	EC	400 g/l	IN44/400EC A	Ciba-Geigy

Metomil
Carbamato. Metomil é um insecticida não sistémico que actua por contacto e ingestão. É activo contra lagartas, afídeos e tripes. Toxicidade: ALTAMENTE. Intervalo de segurança: 7 dias em milho e mapira e 3 dias em batateira, tomate e hortícolas.

Methomex 20% SL	SL	200 g/l	IN40/200SL-A	Enacomo
Methomex 90 SP	SP	90%	IN40/900SL A	Enacomo

Monocrotofos
Organofosforado. Monocrotofos é um insecticida que actua por contacto e ingestão É activo contra várias pragas incluindo brocas, lagartas, afídeos, jassídeos, ácaros e gafanhotos I persistente por 7-14 dias. Toxicidade: ALTAMENTE Intervalo de segurança. 30 dias em trigo, 28 dias em milho, 21 dias em batateira e cenoura, 7 dias em tomate.

Azodrin 25% ULV	UL	250 g/l	IN30/250UBV-A	Shell
Azodrin SL	SL	400 g/l	IN30/400SL A	Shell
Nuvacron 250 UBV	UL	250 g/l	IN30/250UBV-B	Ciba Geigy
Nuvacron 40% SCW	SL	400 g/l	IN30/400SL-B	Ciba Geigy

Marca do produto	Formulação	Teor em substância activa	Nº. do registo	Empresa

Pirimicarbe
Carbamato. Pirimicarbe é um insecticida sistémico que actua por contacto, ingestão e fumigação. É selectivo contra afídeos, poupa os inimigos naturais dos afídeos. Toxicidade: MODERADAMENTE. Intervalo de segurança: 14 dias.

Pirimor 12,5% ED	ED	125 g/l	IN31/125ED-A	ICI

Pirimifos-metilo
Organofosforado. Pirimifos-metilo é um insecticida não sistémico, que actua por contacto e fumigação. É activo contra várias pragas incluindo lagartas, roscas, escaravelhos, afídeos, tripes, jassídeos, cochonilhas, moscas e pragas nos armazens e na saúde pública. O produto está registado para uso na saúde pública e para controlar pragas dos produtos armazenados. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 7 dias.

Actellic 50% EC	EC	500 g/l	IN12/500EC-A	ICI
Actellic 2% DP	DP	2%	IN12/20DP A	ICI

Profenofos
Organofosforado. Profenofos é um insecticida/acaricida não sistémico, que actua por contacto e ingestão. É activo contra várias pragas incluindo lagartas, roscas, escaravelhos, afídeos, tripes, jassídeos, ácaros e traça. Toxicidade: MODERADAMENTE. Intervalo de segurança: 15 dias em milho, batateira, soja e arroz.

Astra 25% ED	ED	250 g/l	IN6/250ED-A	ICI
Astra 37,5 ED	ED	375 g/l	IN6/375ED-A	ICI
Curacron Ulvair 375	UL	375 g/l	IN6/375UBV-A	Ciba-Geigy
Curacron Ulvair 250	UL	250 g/l	IN6/250UBV-A	Ciba-Geigy
Selecron 500 EC	EC	500 g/l	IN6/500EC-A	Ciba-Geigy

Tetraclorvinfos
Organofosforado. Tetraclorvinfos é um insecticida não sistémico que actua por contacto e ingestão. É activo contra lagartas, brocas, pragas de armazens e pragas domésticas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 21 dias.

Gardona 3% DP	DP	3%	IN34/30DP-A	Shell

Marca do produto	Formulação	Teor em substância activa	Nº. do registo	Empresa

Tiodicarbe
Carbamato. Tiodicarbe é um insecticida não sistémico que actua principalmente por ingestão [illegible] activo contra pragas como brocas, lagartas, escaravelhos e jassídeos. Toxicidade ALTAMENTE. Intervalo de segurança: 21 dias em algodão e milho

Larvin 17,5 UBV	UL	175 g/l	IN27/175UBV-A	Sapec
Larvin 37,5 SC	SC	375 g/l	IN27/375SC-A	Sapec

Tralometrina
Piretróide. Tralometrina é um insecticida não sistémico que actua por contacto e ingestão activo contra lagartas e afídeos. Toxicidade. LIGEIRAMENTE. Intervalo de segurança: 7 di em milho.

Tralate 6,5 UBV	UL	65 g/l	IN33/65UBV-A	Sapec

Triclorfão
Organofosforado. Triclorfão é um insecticida não sistémico que actua por contacto e ingestã É activo contra brocas, lagartas, roscas, coleópteros, lagarta mineira, moscas de fruta moscas domésticas e outras pragas na saúde pública. Toxicidade MODERADAMENT Intervalo de segurança: 10 dias em milho e mapira, 7 dias em hortícolas e 3 dias em tomat

Dipterex	SP	95%	IN22/950SP-A	Agroquími
Triclorfão 80% SP	SP	80%	IN22/800SP-A	Quimigal

INSECTICIDAS MISTOS

Cipermetrina + Profenofos
Piretróide + Organofosforado. É um insecticida não sistémico que actua por contacto e ingestã É activo contra várias pragas incluindo brocas, lagartas, roscas, escaravelhos, afídeo tripes, jassídeos e ácaros. Toxicidade: MODERADAMENTE. Intervalo de segurança: 28 d em algodão.

Polytrin C 220 UBV	UL	20+200 g/l	IN34/220UBV-A	Ciba-Geigy

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

INSECTICIDAS PARA USO DOMÉSTICA

Permetrina + Pinaminaforte + Tetrametrina
Piretróides. Está registado para uso na saúde pública contra moscas domésticas, baratas, mosquitos e percevejos. Toxicidade: LIGEIRAMENTE.

Aerosol Dragon	AE	0,3+0,1+0,2%	IN13+14+15/60AE-AICI	

ACARICIDAS

Bromopropilato
Benzilato. Bromopropilato é um acaricida que actua por contacto, com uma certa acção residual. É activo contra vários tipos de ácaros. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 21 dias em citrinos e 14 dias em tomate.

Neoron 500 EC	EC	500 g/l	IN-AC9/500EC-A	Ciba-Geigy

Óleo mineral
Hidrocarboneto. Também chamado por o óleo de verão ou óleo de inverno. É um acaricida que actua por contacto. É activo contra ácaros e cochonilhas nos citrinos. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Bac Oil	EC	853 g/l	IN-AC25/853EC-A	Agroquímicos
Citrex 84,4 EC	EC	844 g/l	IN-AC25/844EC-A	Shell
Toxona Clear	EC	844 g/l	IN-AC25/844EC-B	Shell

Propargite
Sulfito. Propargite é um acaricida que actua por contacto. É activo contra ácaros e cochonilhas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 30 dias em milho, 14 em batateiras e 7 dias em beringela e tomate.

Comité 85,9% EC	EC	859 g/l	IN-AC42/859EC-A	Agroquímicos

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

FUNGICIDAS

Benomil
Carbamato Sistémico. Actua com preventivo e curativo. É usado para o controlo da mancha preta dos citrinos, mas controla também oídios, doenças foliares e doenças de sementes (Fusarium) nas culturas milho, mapira e hortícolas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 14 dias em citrinos.

Benlate 50% WP	WP	50%	FU9/500WP-B	ICI

Bronopol
Alquil hálido. Bronopol é um bactericida e um bacteriostático usado no tratamento de sementes do algodão para o controlo das doenças causadas por bactérias. Toxicidade: MODERADAMENTE. Intervalo de segurança: Não aplicável.

Bronocot 12% DS	DS	12%	BAC1/120DS-A	ICI

Captana
Ftalimida. Actua como preventivo. É usado no tratamento de sementes do milho, mapira, trigo, algodão e hortícolas para o controlo das doenças da semente como Diplodias, Helminthosporium, Rizoctónia, podridão do pé e doenças do solo. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Captab 50% SD	SC	500 g/l	FU5/500SD-A	Agroquímicos

Carbendazime
Benzimidazol. Sistémico. Actua como preventivo e curativo. É usado para o tratamento das doenças das folhas nas culturas de amendoim e citrinos. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 21 dias em amendoim e 14 dias em citrinos.

Bavistin SC	SC	500 g/l	FU14/500SC-A	Agroquímicos

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Enxofre
Inorgânico. Actua como preventivo e curativo (oídios). É aplicado nas culturas de ervilheiras, aboboreiras, pimenteiros, tomateiro e ornamentais para o controlo do oídio e ácaros nas mesmas culturas, assim como nas culturas de citrinos e feijões. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 0 dias.

Enxofre 80% PM	WP	80%	FU10/800PM-A	Quimigal

Hidróxido de cobre
Inorgânico. Actua como preventivo. É usado no controlo de míldio, Alternária, Antracnose Melanoses e outras doenças de diferentes culturas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 14 dias em batateiras e não aplicável nas outras culturas.

Champion 77% WP	WP	77%	FU20/770WP-A	Agroquímicos

Mancozebe
Ditiocarbamato. Actua como preventivo. É aplicado nas culturas de citrinos, batateiras, hortícolas e outras culturas para protege-las das doenças como oídios. Toxicidade: Ligeiramente. Intervalo de segurança: 4 dias em citrinos, hortícolas, batateiras e 28 dias em outras culturas.

Dithane -M45	WP	80%	FU7/800WP-A	Agroquímicos
Dithane -M45	WP	80%	I-U7/800WP-A	Mitsui
Mancozeb 80% PM	WP	80%	FU7/800PM-A	Quimigal

Metalaxil
Acilalanina. Sistémico. Actua como preventivo e curativo contra míldios. É usado para o tratamento de semente. Em mistura com mancozebe é aplicado nas culturas de batata e tomate (ver Ridomil). Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Apron 35 DS	DS	35%	FU1/350DS-A	Ciba-Geigy

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Propiconazole
Triazol. Sistémico. Actua como preventivo e curativo. É aplicado para o controlo das doenç das folhas como ferrugem, oídio, manchas foliares nas culturas de trigo, arroz, amendoi cana-de-açúcar, bananeira, mangueira e cajueiro. Toxicidade: LIGEIRAMENTE. Intervalo segurança: 30 dias.

Tilt 250 EC	EC	250 g/l	FU21/250EC-A	Ciba-Geigy

Propinebe
Ditiocarbamato. Actua como preventivo. É aplicado nas culturas de tomate, batateiras amendoim contra várias doenças como míldios e oídios. Toxicidade: LIGEIRAMEN Intervalo de segurança: 3 dias em tomate e batateiros e 21 dias em amendoim.

Antracol 70% PM	WP	70%	FU5/700PM-A	Agroquímic

Quinometionato
Quinoxalina. Actua como preventivo e curativo. É aplicado nas culturas de tomateiro, crucífer e beringela, para o controlo de oídios. É também activo contra ácaros. Toxicidad LIGEIRAMENTE. Intervalo de segurança. 14 dias em crucíferas, 7 dias em beringela e 3 d. em tomate.

Moresan 25% WP	WP	25%	FU18/2[illegible]-0WP-A	Agroquímic

Tiofanato-Metilo
Carbamato. Sistémico. Actua como preventivo e curativo. É aplicado para o controlo de oídi e doenças de manchas foliares em várias culturas. Toxicidade: LIGEIRAMENTE. Interva de segurança: 14 dias em tomate e bortícolas e 7 dias dias em cebola, soja e citrinos.

Topsin M WP	WP	70%	FU19/700WP-A	Sumitomo

Triadimefão
Triazol Sistémico. Actua como preventivo e curativo. É aplicado para o controlo de oídios ferrugens nas culturas de cucurbitaceas e na cana-de-açúcar. Controla também as doenças d folhas em cereais. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável

Bayleton 25% WP	WP	25%	FU17/250WP-A	Agroquímic

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

FUNGICIDAS MISTOS

Bronopol + Captana
Alquil hálido e ftalamida. Bronopol é um bactericida e bacteriostático e captana é um fungicida. Actua como preventivo. É usado no tratamento de sementes do algodão para o controlo das bacterioses e doenças que afectam a germinação. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Bronocot 42% DS	DS	12% + 30%	FU3+4/420DS-A	Agroquímicos

Carboxin + Tirame
Anilina e ditiocarbamato. Sistémico. É usado no tratamento das sementes de algodão, arroz e soja contra varias doenças transmitidas através da semente. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Vitavax Plus	SC	200+200g/l	FU15+16 /400SC-A	Agroquímicos

Metalaxil + Folpete
Acilalanina e ftalimida. Sistémico. Actua como preventivo e curativo. É aplicado para o controlo de míldio, oídio e manchas foliares. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 14 dias.

Ridomoil Combi 50% PM	WP	10% + 40%	FU1+2/55PM-A	Ciba Geigy

Metalaxil + Mancozebe
Acilalanina e ditiocarbamato. Sistémico. Actua como preventivo e curativo. É aplicado para o controlo de míldio no milho, tomate e batateira. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 14 dias.

Ridomil - Mancozeb 58% PM	WP	10% + 48%	FU1+7/580PM-A	Ciba-Geigy
Ridomil- Mancozeb 72% PM	WP	8% + 64%	FU1+7/720PM-B	Ciba-Geigy

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Ofurace + Mancozebe
Acilamida e ditiocarbamato. Sistémico. Actua como preventivo e curativo. É aplicado para o controlo do míldio nas culturas de tomate e batateira. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 7 dias em tomate e batateira.

Patafol 70% PM	WP	6% + 64%	IN7+8/700PM-A	Quimigal

Pencicuron + Captana
Ureia e ftalinida. Actua como preventivo e curativo. É usado no tratamento das sementes do algodão para o controlo das doenças da sementes rizoctónia e podridão do colo. Toxicidade LIGEIRAMENTE. Intervalo de segurança: Não aplicável

Monceren Combi DS	DS	20% + 300%	FU12+13/700DS-A	Agroquímicos

Propinebe + Cimoxanil
Ditiocarbamato e acetamida. Actua como preventivo e curativo. É aplicado nas culturas de batateira e tomate para o controlo das doenças das folhas incluindo míldio e mancha concêntrica. Toxicidade: LIGEIRAMENTE. Intervalo de segurança 7 dias em batateira e tomate.

Milraz 76% PM	WP	70% + 6%	FU5+6/760PM-A	Agroquímicos

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

HERBICIDAS

Acetocloro
Acetamida. Principalmente absorvido pelas gêmas em desenvolvimento e pelas raízes. É aplicado em pré-emergência para o controlo de gramíneas e certas ervas de folhas largas na cultura do milho, amendoim e batatas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Guardian 900 EC	EC	900 g/l	HE2/900EC-B	Aeroquímicos
Harness 810 EC	EC	810 g/l	HE2/810EC-A	Aerouuímicos
Wenner 800 EC	EC	800 g/l	HE2/800EC-A	ICI

Alacloro
Acetamida. Principalmente absorvido pelas gemas em desenvolvimento e pelas raízes. É aplicado em pré-emergência ou logo após a emergência, para o controlo de gramíneas e algumas ervas de folhas largas nas culturas do milho, feijão, soja, batateira, algodão e hortícolas. Toxicidade LIGEIRAMENTE. Intervalo de segurança: 13 dias em hortícolas e não aplicável para as restantes culturas.

Alacloro 48% EC	EC	480 g/l	HE//480EC-B	Quimiagal
Alacloro-				
Sentrachem 38,4% EC	EC	384 g/l	HE//384EC-C	Sentrachem
Calacloro 48% EC	EC	480 g/l	HE//480EC-B	Neoquímica
Lasso 38,4% EC	EC	384 g/l	HE//384EC-D	Shell
Lasso 384 EC	EC	384 g/l	HE//384EC-A	Aeroquímicos

Asulame
Carbamato. Absorvido pelas folhas, gêmas em desenvolvimento e raízes. É aplicado em pós emergência para o controlo de gramíneas em cana-de-açúcar. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Asulox 40% SL	SL	400 g/l	HE2//400SL-A	Saoec

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Atrazina
Triazina. Principalmente absorvida pelas raízes. É aplicada em pré e pós-emergência para o controlo de ervas de folhas largas e gramíneas em milho, cana-de-açúcar e outras culturas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável

Atrazina 50% WP	WP	50%	HE4/500WP-A	Enacomo
Atrazina 500 SC	SC	500 g/l	HE4/500SC-D	Enacomo
Atrazina 80% WP	WP	80%	HE4/800WP-D	Enacomo
Atrazina-				
Sentrachem 80% WP	WP	80%	HE4/800WP-B	Sentrachem
Callitraz 50% WP	WP	50%	HE4/500WP-D	Neoquímica
Gesaprim 500 SC	SC	500 g/l	HE4/500SC-A	Ciba Geigy
Gesaprim 80% PM	PM	80%	HE4/800PM-B	Ciba Geigy

Bentazona
Diazina. Principalmente absorvido pelas folhas. É aplicado em pós-emergência para o controlo das ervas de folhas largas incluindo ciperáceas (juncos) nas culturas de feijão, milho, mandioca, trigo, amendoim, soja e arroz. Toxicidade LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Basagran 480 SC	SC	480 g/l	HE26/480SL-A	Aeroquímicos

Bromacil
Diazina. Principalmente absorvido pelas folhas. É aplicado para o controlo das gramíneas anuais e perenes assim como as ervas de folhas largas nas áreas industriais, em citrinos, ananás e sisal. Toxicidade: LIGEIRAMENTE. Intervalo de segurança. Não aplicável

Hyvar duPont 80% PM	WP	80%	HE30/800PM-A	ICI

Butacloro
Acetamida. Principalmente absorvido pelas gêmas em desenvolvimento, mas também pelas raízes. É aplicado em pós-emergência para o controlo de ervas de folhas largas e gramíneas na cultura do arroz. Toxicidade: LIGEIRAMENTE. Intervalo de segurança. Não aplicável

Butacloro-				
Sentrachem 60 EC	EC	600 g/l	HE6/600EC-B	Sentrachem
Machete 600 EC	EC	600 g/l	HE6/600EC-C	Aeroquímicos

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Cianazina
Triazina. É absorvido pelas raízes e folhas. É aplicado em pré e pós-emergência para o controlo de ervas de folhas largas e gramíneas nas culturas de milho, algodão, cana-de-açúcar e trigo. É comum misturar cianazina com outros herbicidas. Toxicidade: MODERADAMENTE. Intervalo de segurança: Não aplicável.

Fortrol 5 SC	SC	50 g/l	HE15/50SC-A	Shell

Cicloxidina
Cicloexanona. É absorvido pelas folhas. É aplicado em pós-emergência para o controlo de gramíneas perenes e anuais nas culturas de citrinos, amendoim, abacate, feijão, algodão, beterraba e soia. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Focus Ultra	UL	200 g/l	HE24/200UBV-A	Agrouufmicos

Dazomete
Triadiazina. É um pesticida para o controlo total dos organismos vivos no solo incluindo sementes de infestantes, insectos, nematodos e fungos. A utilização deste produto requer uma boa preparação do solo. Intervalo de segurança: Não aplicável.

Basamid 98 GR	GR	98%	HE34/980GR-A	Agrouufmicos

Dimetametrina
Triazina. É principalmente absorvido pelas folhas mas também pelas raízes. É aplicado em pré-emergência para o controlo das ervas de folhas largas na cana-de-açúcar. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Dimenax 500 EC	EC	500 g/l	HE9/500EC-A	Ciba-Geiey

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Diquato
Composto quaternário de amónio. É absorvido rapidamente pelas folhas que depois são destruídas. É aplicado em pós-emergência para o controlo de todos tipos de infestantes entre linhas, e em pré-plantio, mas depois da emergência das infestantes. Este produto é também usado para a dessecação da cultura. Toxicidade: MODERADAMENTE. Intervalo de segurança: Não aplicável.

Reglone 250 SL	SC	250 g/l	HE37/250SL-A	ICI

Diurão
Ureia. Principalmente absorvido pelas raízes. É aplicado selectivamente em pré-emergência das infestantes e em pré-plantação ou imediatamente após e em árvores já estabelecidas. É usado para o controlo de todos tipos de infestantes nas culturas de ananás, bananeiras, citrinos e cana-de-açúcar. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicavel

Diurão 80% PM	WP	80%	HE24/800PM-A	Quimigal

Etidimurão
Ureia. Principalmente absorvido pelas raízes. É usado para o controlo de todos tipos de infestantes e arbustos nas áreas sem culturas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Ustilan 10 GR	GR	10%	HE19/100GR-A	Agroquímicos

Fluazifop-p-butil
Éster fenoxialcanóico. É um herbicida sistémico e selectivo, que é absorvido através das folhas. É aplicado em pós-emergência para o controlo de gramíneas anuais e perenes nas culturas de algodão, cana-de-açúcar, feijão e cebola. Toxicidade LIGEIRAMENTE. Intervalo de segurança 70 dias em algodão, 60 dias em feijão, 40 dias em cebola e 7 dias em cana de-açúcar

Fusilade 12,5 EC	EC	125 g/l	HE3/125EC-A	ICI

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Fluometurão
Ureia. Principalmente absorvido pelas raízes. É aplicado em pré-emergência para o controlo de ervas de folhas largas e gramíneas na cultura do algodão. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Cotoran 500 SC	SC	500 g/l	HE12/500SC-A	Ciba-Geigy

Glifosato
Aminoácido. É um herbicida sistémico e não selectivo. É absorvido pelas folhas e caules. É aplicado, quando as infestantes têm folhas bem desenvolvidas. É activo contra gramíneas perenes e anuais e as ervas de folhas largas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Nao aplicável.

Glifogan 48% SL	SL	480 g/l	HE10/480SC-B	Enacomo
Glifosato 48% SL	SL	480 g/l	HE10/480SC-C	Neoquímica
Roundup	SL	480 g/l	HE10/480SC-A	Agroquímicos
Sting 18% SL	SL	180 g/l	HE10/180SL-A	Agroquímicos

Glifosato-trimesium
Aminoácido. A substância activa actua na mesma maneira como glifosato, mas tem um efeito mais elevado. Ver glifosato. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Nao aplicável.

Touchdown	SL	480 g/l	HE10/480SL-A	ICI

Hexazione
Triazina. Absorvido pelas folhas. É aplicado em pós-emergência para o controlo de gramíneas e ervas de folhas largas na cultura de cana-de-açúcar e áreas industriais. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Velpar Dupont 90% SP	SP	90%	HE22/900SP-A	ICI

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

MCPA
Ácido fenoxialcanóico. Principalmente absorvido pelas folhas. É aplicado em pós-emergênc para o controlo das ervas de folhas largas e ciperáceas nas culturas de cana-de-açúcar, trig milho, arroz e mapira. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 14 dias.

MCPA 40 EC	EC	402 g/l	HE18/402EC-A	Quimigal
MCPA 40% SL	SL	400 g/l	HE18/400SL-A	Quimigal
MCPA 400 EC	EC	400 g/l	HE18/400EC-A	Agroquímic
MCPA-Sentrachem 40% EC	EC	400 g/l	HE18/400EC-A	Sentrachem

Metazacloro
Acetamida. Absorvida pelas raízes. É aplicada em pré-emergência para o controlo de gramíneas e certas ervas de folhas largas nas culturas de cana de açúcar, milho, amendoim, batateir soja e girassol. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

PREE 40% EC	EC	400 g/l	HE29/400EC-A	Agroquímic

Metolacloro
Acetamida. Principalmente absorvida pelas gêmas em desenvolvimento. É aplicado em pr emergência para o controlo de gramíneas nas culturas de amendoim, algodão, milho, batateir mapira, cana-de-açúcar e girassol. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: N aplicável.

Dual 960 EC	EC	960 g/l	HE5/960EC-A	Ciba Geigy

Metribuzina
Triazina. Principalmente absorvida pelas raízes. É aplicada em pré-emergência e pós emergên para o controlo das ervas de folhas largas e certas gramíneas nas culturas de soja, cana d açúcar, batateira e tomate. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: N aplicável.

Lexone Dupont 48% SC	SC	480 g/l	HE11/480SC-A	ICI
Lexone Dupont 75% WG	WG	75%	HE11/750WG-A	ICI
Lexone WG	WG	75%	HE11/750WG-B	Shell
Metribuzina Sentrachem	WG	48%	HE11/480WG-A	Sentrachem
Sencor 48% SC	SC	480 g/l	HE11/480SC A	Agroquímic
Sencor 70% PM	WP	78%	HE11/700PM-A	Agroquímic

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Molinate
Tiocarbamato. Absorvido pelas raízes. É aplicado em pré-emergência, para o controlo de gramíneas e ervas de folhas largas na cultura do arroz. Toxicidade: MODERADAMENTE. Intervalo de segurança: Não aplicável.

Ordram 6 EC	EC	60 G/L	HE21/60EC-A	ICI

Oxadiazão
Oxadiazolona. Acção de contacto sobre propágulos em germinação. É aplicado em pré e pós-emergência, para o controlo de gramíneas e ervas de folhas largas na cultura do arroz e cebola. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável

Ronstar 25% EC	EC	250 g/l	HE16/250EC-A	Quimigal

Paraquate
Composto quaternário de amónio. É absorvido rapidamente pelas folhas que depois são destruídas. É aplicado em pós-emergência para o controlo de todos tipos de infestantes entre linhas, e em pré-plantio, mas depois da emergência das infestantes. Toxicidade: ALTAMENTE Intervalo de segurança: Não aplicável.

Gramoxon 20% Blue	SL	200 g/l	HE2/200sl-A	ICI

Pendimetalina
Fenilamina. Absorvido pelas raízes e gêmas terminais em desenvolvimento. É um herbicida selectivo. É aplicado em pré-emergência para o controlo de gramíneas e certas ervas de folhas largas nas culturas do milho, algodão, amendoim, feijão, girassol e soja. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Stomp 50% EC	EC	500 g/l	HE1/500EC-A	Agroquímicos

Prometrina
Triazina. Principalmente absorvido pelas folhas e gemas em desevolvimento. É aplicado em pré-emergência para o controlo de gramíneas e ervas de folhas largas nas culturas de algodão e girassol. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Gesagard 500 SC	SC	500 g/l	HE13/500SC-B	Ciba-Geigy
Prometrina 50% SC	SC	500 g/l	HE13/500SC-A	Quimigal

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Propanil
Propinamida. Absorvido pelas folhas, acção de contacto. É aplicado em pós-emergência para o controlo de gramíneas e certas ervas de folhas largas na cultura do arroz. Toxicidade LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Propanil 36% EC	EC	360 g/l	HE17/360EC-D	Quimigal
Propanil-Sentrachem 360 EC	EC	360 g/l	HE17/360EC C	Sentrachem
Propanin CNDA	EC	360 g/l	HE17/360EC B	J F S
Stam-F-34	EC	360 g/l	HE17/360EC-D	Mitsui
Surcopur 36% EC	EC	360 g/l	HE17/360EC-A	Agroquímicos

Quinclorac
Quinolina. Absorvido pelas raízes e parcialmente pelas folhas. É aplicado em pré e pós emergência, para o controlo de gramíneas na cultura do arroz. Toxicidade: LIGEIRAMENTE Intervalo de segurança: Não aplicável.

Facet 25% EC	EC	360 g/l	HE17/360EC-A	Agroquímicos

Terbutrina
Triazina. Principalmente absorvido pelas raízes e pelas folhas. É aplicado em pré-emergência para o controlo de ervas de folhas largas nas culturas de trigo, girassol, tomate, hortaliça, cana de-açúcar, ananás e sisal. Toxicidade: LIGEIRAMENTE. Intervalo de segurança 30 dias em todas as culturas.

Igran 500 SC	SC	500 g/l	HE14/500SC-A	Ciba-Geigy
Terbutrina 50% SC	SC	500 g/l	HE14/500SC - B	Quimigal

Tiobencarbe
Tiocarbamato. Absorvido pelas raízes e folhas. É aplicado em pós-emergência precoce para o controlo de gramíneas e ervas de folhas largas na cultura do arroz. Toxicidade LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Saturn 50% EC	EC	500 g/l	HE31/500EC - A	Agroquímicos

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

HERBICIDAS MISTOS

Atrazina + Cianazina
Triazinas. Absorvido pelas raízes e pelas folhas. É aplicado em pré e pós-emergência, para o controlo de gramíneas e ervas de folhas largas nas culturas do milho e cana-de-açúcar. Toxicidade: MODERADAMENTE. Intervalo de segurança: Não aplicável.

Bladex Plus	SC	333 + 167 g/l	HE4+15/500SC-A	Shell

Atrazina + Triazina
Triazinas. Principalmente absorvido pelas raízes. É aplicado em pré emergência para controlo de gramíneas anuais e ervas de folhas largas nas culturas do milho, cana-de-açúcar e mapira. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Bac Atrazina 80% PM	WP	80%	HE4/800PM-A	Agroquímicos

Bentazona + Propanil
Diazina e propionamida. Absorvido pelas folhas. É aplicado em pós-emergência para o controlo de gramíneas, ervas de folhas largas e ciperáceas (tiririca) na cultura de arroz. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Basagran PL2	EC	160 g/l + 340 g/l	HE26+17/500EC-A	Agroquímicos

Bromoxinil + MCPA
Benzonitrilo e fenoxialcanóico. Principalmente absorvido pelas folhas. É aplicado em pós-emergência para o controlo de ervas de folhas largas nas culturas do milho, trigo e cevada. Toxicidade: MODERADAMENTE. Intervalo de segurança: 21 dias em todas as culturas.

Bromoxinil + MCPA 40% EC	EC	200 + 200 g/l	HE18+25/400EC-A	Quimigal

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Diprometrina + Metolacloro
Triazina e Acetamida. Principalmente absorvido pelas raízes e gêmas em desenvolvimento aplicado em pré-emergência na cultura do algodão, para o controlo de gramíneas e ervas folhas largas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança. Não aplicável.

Cotodon 400 EC	EC	240 + 160 g/l	HE5+36/400EC-A	Ciba Geigy

Fluometurão + Prometrina
Ureia e Triazina. Absorvido pelas raízes e pelas folhas. É aplicado em pré emergência para controlo de gramíneas e ervas de folhas largas na cultura do algodão. Toxicidade LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Cotogard 500 SC	SC	500 g/l	HE12+13/500SC-A	Ciba-Geigy

Ioxinil + Bromoxinil
Benzonitrilo. Absorvido pelas folhas. É aplicado em pós-emergência para o controlo de ervas de folhas largas na cultura de cana-de-açúcar. Toxicidade MODERADAMENTE. Intervalo segurança: Não aplicável.

Oxitril 40% EC	EC	200 + 200 g/l	HE25+26/400EC-A	Quimigal

Mecoprope + Diclorprope + MCPA
Ácido fenoxialcanóico. Absorvido pelas folhas. É aplicado em pós emergência para o controlo de ervas de folhas largas nas culturas de milho, trigo e arroz. Toxicidade LIGEIRAMENTE. Intervalo de segurança: 20 dias em todas as culturas.

Duplosan Super	SC	130 + 310 + 60 g/l	HE17+28+18/600SL A	Agroquímicos

Metobromurão + Metolacloro
Ureia e Acetamida. Absorvido pelas raízes, folhas e gêmas em desenvolvimento. É aplicado em pré-emergência e pré-transplante, para o controlo de gramíneas e ervas de folhas largas nas culturas de feijão, pimento, batateira, tomate, amendoim, girassol tabaco e soja. Toxicidade LIGEIRAMENTE. Intervalo de segurança: Não aplicável

Galex 500 EC	EC	250+250 g/l	HE4+5/500EC-A	Ciba-Geigy

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

Metolaclore + Atrazina
Acetamida e Triazina. Absorvido pelas raízes e gemas em desenvolvimento. É aplicado em pré-emergência para o controlo de gramíneas e ervas de folhas folhas largas na cultura do milho. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Primagram 500 SC	SC	250 + 250 g/l	HE4+5/500SC-B	Ciba-Geigy
Primextra 500 SC	SC	330 + 170 g/l	HE4+5/500SC-A	Ciba-Geigy

Paraquato + Diurão
Composto quaternário de amónio e Ureia. É absorvido rapidamente pelas folhas e pelas raízes. É aplicado em pós-emergência para o controlo de todos tipos de infestantes das culturas de citrinos, cana-de-açucar, bananeira e outras, entre linhas e em pré-plantio, mas depois da emergência das infestantes. Toxicidade: ALTAMENTE. Intervalo de segurança: Não aplicável.

Gramuron Azul 40 SC	SC	100 g/l+300 g/l	HE2A/400SC-A	ICI

Piperofos + Propanil
Organofosforado e Propionamida. Absorvido pelas raízes folhas e gêmas em desenvolvimento É aplicado em pós-emergência para o controlo de gramíneas e ervas de folhas largas na cana-de-açúcar e arroz. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Rilof S 395 EC	EC	145 + 250 g/l	HE17+33/395EC-A	Ciba-Geigy

Terbutrina + Metolaclore
Triazina e Acetamida. Absorvido pelas raízes, folhas e gêmas em desenvolvimento. É aplicado antes da emergência das infestantes para o controlo de gramíneas e ervas de folhas largas. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: [illegible] dias.

Igran Combi 500 EC	EC	500 g/l	HE5+14/500EC-A	Ciba-Geigy

Tiobencarbe + Propanil
Tiocarbamato e Propionamida. Absorvido pelas raízes e folhas. É aplicado em pós-emergência para o controlo das gramíneas e ervas de folhas largas na cultura do arroz. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: Não aplicável.

Satunil 60% EC	EC	400 + 200 g/l	HE17+31/600EC-A	Agroquímicos

Marca do produto	Formulação	Teor em substância activa	No. do registo	Empresa

RODENTICIDAS

Todos os rodenticidas registados são do tipo cumarina, que actua por ingestão e depois por anticoagulação. São muito tóxicos para roedores, mas não actuam antes de 3-5 dias Toxicidade: MODERADAMENTE.

Brodifacume				
Klerat	BB	0,005%	RO3/0,005BB-A	ICI
Klerat OR	AB	0,005%	RO3/0,005AB-A	ICI
Bromadiolona				
Lanirat	RB	0,005%	RO5/0,005RB-A	Ciba-Geigy
Cumatetralil				
Racumin rat bait block	BB	0,0375%	RO2/0,0375BR-A	Agoquímicos
Flocumafena				
Storm	BR	0,005%	RO4/0,005BR-A	Shell

AVICIDAS

Fentião
Organofosforado. Fentião é um avicida que actua por contacto. É aplicado no controlo de pássaros na agricultura. Toxicidade: MODERADAMENTE. Intervalo de segurança: Não aplicável.

Queletox 64% UBV	UL	640 g/l	AV38/640UBV-A	Agroquímicos

Marca do produto	Formulação	Teor em substância activa	Nº. do registo	Empresa

MOLUSCICIDAS

Metiocarbe
Carbamato. Metiocarbe actua por contacto e ingestão. É usado em agrícola e em plantas ornamentais no controlo de caracóis, lesmas e milípés. Toxicidade: MODERADAMENTE. Intervalo de segurança: Não aplicável.

Mesurol Snail Pellets	GB	0.2%	MO1/20GB-A	Agroquímicos

REGULADORES DE CRESCIMENTO

Mepiquat cloride
Composto quaternário de amínio. Mepiquat cloride inibe o alongamento celular, diminuindo a altura e o tamanho das plantas de algodão. Toxicidade: LIGEIRAMENTE. Intervalo de segurança: 30 dias em algodão.

Pix 0,5 SL	SL	5 g/l	RC1/5SL-A	Agroquímicos

CARRICICIDAS

Clorfenvinfos
Organofosforado. Clorfenvinfos actua por contacto e ingestão. É aplicado no banho, para combater várias carraças no gado e ovelhas. Toxicidade: ALTAMENTE.

Supona 30	EC	300 g/l	CA1/300EC-A	Shell

INDICE ALFABETICO

Annex C.4 **"Associaçao das Empresas de Agroquimicos de Mocambique" ("Association of Agrochemical Companies of Mozambique"), draft constitution**

CONSTITUITION

DRAFT

1. NAME

The name of the Association shall be "ASSOCIAÇAO DAS EMPRESAS DE AGROQUIMICOS DE MOÇAMBIQUE"

2. DEFINITION

"AGROCHEMICALS" means pesticides, and growth regulators which are applied to crops, the soil, livestock; or for public health or amenity uses.

~~DEFINITION OF INDUSTRY~~

2.2 The ASSOCIAÇAO DAS EMPRESAS DE AGROQUIMICOS DE MOÇAMBIQUE hereinafter referred to as the "Association" means, without in any way limiting ordinary meaning of the expression, the industry in which Members of the Association are associated for the purpose of importation and/or manufacture and/or development and/or formulation or agricultural chemicals and animal health remedies which are primarily for the treatment of crops, the soil and livestock and for the furtherance of the objects of the Association as herein defined.

2.3 "PESTICIDE" means a preparation containing any substance, whether organic or inogarnic, existing in the pure state or as manufactured commercially having any of the following properties:-

2.3.1 destroying any insect, mite, molluse, nematode, fungus, bacterium, virus, rodent or other pest capable of destroying, damaging or retarding the growth or any form of plant life before or after harvesting or damaging anyfood stuff during storage, processing or transport.

2.3.2 attracting, repelling, sterilising, stupefying, inhibiting the feeding of or otherwise directly or indirectly controlling the activity of, or preventing or mitigating the harmful effect of any such pest or any form of plant life or stored food;

2.3.3 destroying or controlling any form of unwanted plant or animal life.

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2-3.4 "GROWTH REGULATOR" means a prepation containing any substance, whether organic or inorganic, existing in the pure state or as manufactured commercially having any of the following properties; acting as a growth regulator, d foliant, desiccant, agent for thinning fruit, preventing the premature fall of fruit or assisting in the utilisati of plant nutrients.

3 OBJECTS

THE ASSOCIATION'S overring objective is to promote optima food and fibre production through appropriate crop and livestock protection with agrochemicals and to ensure tha the properties and application of these products are in c formity with the needs of agriculture and society, minimi zing hazards for man, animal and the environment.

3.1 TO PROMOTE improvement in Public Health and Amenity secto through appropriate application of Agrochemicals and to er sure that the properties and application of these product are in conformity with the needs of society, minimizing ha zards for man, animal and the environment.

3.2 TO PROMOTE the safe and sensible research, development, fc mulation, handling, packaging, labelling, storage and trar port of agrochemicals by setting and recommending high sta dards in conformity with internationally accepted princi- ples.

3.3 TO PROMOTE the safe and sensible application of agrochemi- cals for the protection of the user, the environment and the consumer in conformity with national and international standards and regulations.

3.4 TO PROVIDE a forum for discussion, expert advice, and info mation on scientific, technical and practical issues for e tension staff, distributors, users of agrochemicals, the medical infrastructure and the public.

3.5 TO COLABORATE with and give advice to Government Ministrie in the formulation and improvement of regulatory procedu- res concerning agrochemicals.

3.6 TO HELP the public to understand the purpose and the natur of agrochemicals and the benefits they bring to food pro- duction, health, the economy and related areas.

3.7 TO ACT as a focal point for Government, the media, and the public in all issues relating to the ~~Industry~~ empresas de agroquimicos de Mocambique (ANIPLA).

4 POWERS

In furtherance of the foregoing objects and for the better attainment thereof, the following shall be the powers of the Association:-

4.1. to implement the Code of ~~Practice~~ Conduct embodied herein and to ta ke such measures as may be deemed fit to ensure compliance therewith;

4.2 to represent the views of members to, and to co-operate wit any government department, local authority, institution, association or other bodies in regard to any matters direc- tly or indirectly affecting the ~~industry~~ Associacion.

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4.3: to co-operate or affiliate with any institution, associat: or society, having objects altogether or in part similar t the objects of this Association and in particular to co-op rate to the best of the Association's ability with all org nizations seeking the improvment of agricultural, pastoral and livestock production;

4.4 to co-operate with all those endeavouring to safeguard the health of the general public especially in their efforts t control environment pollution;

4.5 to encourage, initiate, but not undertake research in the application of agricultural chemicals under local conditio: and to promote public education concerning the safe use of such chemicals;

4.6 to encourage and promote harmonious relationships between employers and employees in the Industry with particular re- gard to the settlement of disputes by conciliatory methods;

4.7 to encourage the establishement of good conditions in prem: ses in which work is carried out, in regard to the prevent: of accidents and generally to promote the reasonable inte- rests of all concerned in the Association;

4.8 to promote the interest of apprentices in the Association a in particular to encourage the pratical and technical trai- ning of such apprentices and also to encourage every effor: through apprenticeship and training to turn out efficient operatives within the industry;

4.9 to promote or establish mutual benefit schemes for Members;

4.10 to promote, support or oppose, as may be deemed expedient, any proposed legislative or other measure affecting the in- terests of Members;

4.11 to consider and, where possible and desirable in the common interest of Members, to deal with matters relating to:-

- 4.11.1 customs duties and rates;
- 4.11.2 currency allocations and import restrictions;
- 4.11.3 registration and labelling of agricultural chemica: as designated;
- 4.11.4 packaging specifications and regulations;
- 4.11.5 railage rates and regulations;
- 4.11.6 safety codes for the chemicals as designated;
- 4.11.7 analytical test methods;
- 4.11.8 other similar matters of common interest to member:

4.12 to collate, disseminate, or make available information on a: matter connected with or affecting the association for the benefit of its memebers;

4.13 to print, publish, contribute or otherwise support any maga- zine, periodical brochure or other publication as may be co: sistent with any objects of the Association;

4.14 to communicate, exchange information or become associate with any organization in the coutry, the aims of which are not inconsistent with the objectives of this Associa tion;

4.15 to operate a banking account or accounts;

4.16 to repeal, amend, add to or otherwise vary the provision of the constitution;

4.17 to do all such lawful things as are pertinent or conduci ve to the attainment of the objects of the Association, or in the interest of its members.

5 Membership

Eligibility for Membership

5.1. Membership shall be open to firms or bodies corporate in Mozambique which are engaged or wish to engaged in the industry in Mozambique and who are prepared to abide by the rules and conditions of membership.

5.2 The Executive Committee shall be empowered to investi- gate all aspects of eligibility as laid down hereun- der.

5.3 Membership of the Association will in the first instar ce be dependent upon the applicant providing proof of being able to comply fully with the following standar- ds for acceptance;

5.3.1 Contribution to the Association's Public Relations Campaign an/or any other campaing or fund agreed to by the Association at a general meeting. The level of contribution of members ~~is dependent on their size and scale of operation~~ and shall be determined by the Executive Committee.

5.3.2 Permanent employment of professionally qualified or suitable experienced staff in the revelant technical fields of a standard acceptable to the Association.

5.3.3 For the importers of ready-formulated material ownership of, or, direct regular ~~access~~ to, laboratory facilities for all physica determinations for quality control, where produc is locally formulated, the importer must have is own laboratory facilities capable of carrying ou such physical determinations. These laboratories must be permanently staffed by suitable employee.

For the determination of active ingredient concentrations and for full chemical analysis of im ported products, formal and specific arrangement must be made with recognised laboratories and proof of such arrangements must be forwarded to the Executive Committee before membership may be approved.

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5.3.4 Ownership of, or direct regular access to warehouse facilities which setisfy the ~~min~~ standards as laid down FAO GIFAP.4

5.3.5 Provision of appropriate insurance cover. In order to protect the interests of end users and distributors, it is vital that members of the Association be adequately insured. A product liability policy covering consequential loss to the end user of at least ~~25 thousand~~ per claim is required.

5.3.6 In order to protect the integrity of the Association, any organisation wishing to become a member of the Association must prove corporate financial strength. A minimum requirement is fully paid up share capital of

6 Admittance into Membership

6.1 All applications for membership must be submited to the Chairman of the Associatic on the Association's membership applicatio form.

6.2 The executive comittee shall notify all exi ting members of such applications for membership, together with all relevant partic lars of such applicants. Existing members shall therafter have the right to lodge an objection with the Chairman of the Associa tion within twenty-one (21) days of the se: vice of such notice in eccordance with the provision of section 19.1 hereafter.

6.3 If no objection is lodged within the pres- cribed period and provided that the appli: cant meets the full requirement of the Assc ciation the executive comittee shall be em- powered to accept the applicant for member- ship and payment of the required fees shal: thereupon automatically entitle the appli- cant to membership.

6.4 If the event of an objection being lodged within the prescribed period, the chairman shall convene a special general meeting by notice given to all Members in accordance with the provisions of Clause 19.1 hereof, to be held no less than seven(7) days nor more than fourteen (14) days after the specific purpose of determining whether or not to accept the application of determining whether or not accept the application for Membership.
The special general meeting shall discuss t application and acceptance of membership wr ch granted only if approved by a majority c two-thirds of the members present and enti- tled to vote.

6.5 Thereafter the application shall be notified of his acceptable or non-acceptance into Association as so determined at the special general meeting by a two-third majority vote of those personally present and entitled to vote whereupon the provisions of clause 8.3 shall apply.

6.6 Should the application for membership not be approved, the chairman of the Association will advise the applicant of the reasons for the failure of his application. The applicante may therefore re-submit his application once he is able to satisfy totally the requirements for membership.

6.7 The Executive and members may not divulgue the source of any objections.

6.8 Nowithstanding the aforegoing and for as long as the Association shall affiliated to the [illegible] it shall be ~~a prerequisite of membership of the Association~~ that each member shall also be a member of the [illegible]

6.9 The [illegible]

7. Obligations of Membership

7.1 Each member by virtue of his membership, shall be deemed to have agreed to abide by the provisions of this constitution and the Code of Practice embodied therein, and by sych other conditions of membership as may from time to time be determine by the executive committee or by members in general meeting as the case may be, and to this end each member shall notify the association in writing of his postal address and any subsequent change tereof.

7.2 Any member who infringes any of the terms of this constitution or acts in a manner which is detrimental to the interest of the association shall be subject to such disciplinary action as the executive committee may deem appropriate in terms of clause 12 hereunder.

7.3 Members shall agree to an inspection of their facilities if requested by an appointed representative of the executive committee.

10.8 Resignation and Termination of Membership

8 10.1 A member may resign by giving three months notice in writing to the Association, provided that to such resignation shall take effect until all monies due to the Association by the member concerned have been paid.

8 10.2 Any member who is more than two (2) months in arrears in his subscription or any other monies due to the Association and who thereafter fails to pay within thirty (30) days of demand may, by resolution of the executive committee, have his membership suspended or terminated.

9 Re-admission into Members

9.1 A member who has resigned from the Association or has had his membership terminated as herein provided may be invited by the executive committee to rejoin upon such conditions as may be deemed fit.

9.2 If the conditions of re-admission are considered by the former member to be unreasonable, he shall have the right of appeal at the next general meeting of the association provied that he informs the Association in writing within seven (7) days of the receipt of the aforesaid conditions of his intentions so to appeal.

10 Substitutions and reinstatement of Representatives

The executive committee may at any time, call upon a member to withdraw his representative and substitute another if in the opinion of the executive committee, the first appointed representative has acted willfully in contravention of this constitution or has conducted himself in a manner unbecoming to the Association, provided that any representative so withdrawn may be subsenquently reinstated such time and upon such conditions as the executive committee or members in general meeting, as the case may be, may decide.

11 Discipline

11.1 The executive committee shall have the power to suspend or terminate membership and/or to impose a fine on a member in the event of his contravening any of the provisions of this constiution or code of practice, provided that such fine shall not exceed 500 cts in the case of a first offence and 1000 cts in respect of every subsequent offence.

11.2 Notwithstanding any of the foregoing provisions, no member may have his membership suspended or terminated or be subject to any fine unless he has been afforded an opposition to state his case personally at an executive committee meeting of which he has received not less than seven (7) days notice in writing informing him of the date, time and venue of the meeting and stating the nature of the offence with which he is being charged.

11.3 At any such meeting, the member shall be entitled to call withnesses in support of his case and any decision reached by executive committee shall not take effect until after the expiry of the period hereunder allowed for an appeal to be lodged.

11.4 A member who has appeared before the executive committee in accordance with the provisions of this section and who may be dissatisfied with the subsequent decision of the executive committee, shall have the right to applear against the decision by written notice to the secretary within seven (7) days of the date in which the decision was communicated to him.

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14 15.5 upon receipt of such an appeal the secretary shall convene a special general meeting, by notice given to all members in accordance with the provisions of Clause 21 hereof to be held not less than seven (7) nor more than fourteen (14) days thereafter, at which the member concerned shall have the right to be heard and to call witness in support of his case and at the conclusion of the proceedings any decision reached by a two-third majority vote of those personally present and entitled to vote at the meeting shall become binding upon both the Association and the applicant with immediate effect.

14 15.6 Upon the termination or suspension of his membership, a member shall thereupon become liable for all monies due by him to the Association and if these are not paid within thirty (30) days of demand the executive committee may take such steps as may be deemed necessary to secure settlement.

19 SUBSCRIPTIONS, SECRETARIAL FEES AND LEVIES

19.1 The amount of subscription an/or secretarial fee and/or levy payable per annum by each Member shall be decided by a majority vote of Members in The General Meeting.

19.2 ANY Member who is more than two (2) months in arrears in his subscription or any other monies due to the Association and who thereafter fails to pay within thirty (30) days of demand will have his Membership terminated.

18 13 GENERAL MEETINGS

13 16.1 NOTICE specifying the place, the day and the hour of every General Meeting and the nature of the business to be transacted at that meeting shall be given in writing at least twenty-eight (28) days prior to the holding of the Meeting.

13 15.2 QUORUM AT GENERAL MEETINGS

13 15.2.1 ATTENDANCE of 90% of all Members shall constitute a quorum.

13 15.2.2 If within thirty (30) minutes from the time appointed for the meeting a quorum is not present, the meeting shall stand adjourned to such other day and any such other time and place as the Chairman may determine, and if at the adjourned meeting a quorum is not present within twenty (20) minutes, those persons is not present within twenty vote shall constitute a quorum.

16 14 ANNUAL GENERAL MEETING

The annual General Meeting of the Association shall be held once in every calendar year, but not more than six (6) months after the end of the preceding financial year on such date and at such time and place as may be determined by the Executive Committee, provid that the meeting shall be convened by written notice given to all members, in accordance with the provisions of Clause 15. hereof at least twenty-eight (28) days prior to the holding of such Annual General Meeting.

14 16.1 The business of the Annual General Meeting shall include

14 16.2 The reading of the notice convening the Meeting;

14 16.3 The reading and confirmation of the Minutes of the pre-

vious Annual General Meeting;

14
16.4 The consideration and adoption of the Annual Report;

16.5 The approval and adoption of the Annual Accounts of Association;

14
16.6 The setting of the Annual Membership subscription and any other fee or levy;

14
16.7 The election of the Executive Committee, namely, Chairman; Vice Chairman; Secretary; Treasurer; and other representatives.

14
16.8 The appointment of Auditors;

14
16.9 The consideration of any notices of motion submitted and such other business, relevant to the affairs of the Association of which due notice shall have been given;

14
16.10 And with the approval of the majority of those present and entitled to vote, matter of immediate importance and urgency.

14
16.11 Special General Meetings

14 16.11.1 In addition to and apart from any obligatory special general meeting convened in accordance with the provisions of clause in 7.2 hereof a special general meeting may be called at any time at the instance of the executive committee or upon requisition from not less than five (5) members of the Association by not less than fourteen (14) days notice given in accordance with the provisions of Clause 15.1 hereof.

14
16.11.2 Only business of which due and proper notice has been given shall be transacted at a general meeting except that, with the approval of the majority of those persons present and entitled to vote, decisions on matters of immediate importance and urgency may be taken.

15 CHAIRMAN

15.1 No Member or his representative shall occupy the office of Chairman for more than two (2) years in succession.

15.2 The Chairman, or in his absence, the Vice-Chairman shall preside at a General Meeting.

15.3 In the absence of both the Chairman and the Vice-Chairman the meeting shall elect a Chairman, from amongst the persons present, who shall preside at that meeting only.

16 VOTING

16
16.1 Voting at General Meetings of the Association shall be by a show of hands or by ballot of the persons present and entiled to vote.

16
16.2 A ballot shall be held either at the discretion of the Chairman or at the insistence of a majority of the persons present and entitled to vote.

18.3 Each Member shall be entitled to one (1) vote only to be exercised by his principal representative, except that the Chairman shall have, in adition to his deliberative vote, a casting vote in cases of equality voting.

19. EXECUTIVE COMMITTEE

19.1 Autority

Subject to the control herein specifically reserved to members in general meeting, the autority for the management and conduct of the affairs of the Association shall be vested in an executive committee, whose members shall be elected annuallly in accordance with the provisions of this constitutition, which shall manage and conduct the affairs of the Association in furtherance of its objects, and in so doing may perform any act or thing that the Association in general meeting could do or perform.

19.2 Powers

In accordance with the autbority conferred upon the executive committee by Clause 19.1 hereof and without in any way limiting the powers it derives thereform, the executive committee is hereby specifically empowered:-

19.2.1 To implement the procedures laid down in clause 8 for membership of the Association:

19.2.2 To implement the Code of Practice embodied in this constitution and to take such of those measures herein provided as may be deemed fit to ensure compliance therewith;

19.2.3 To implement those provisions of this constitution specifically delegated to the executive committee and to take such action as may be deemed appropriate in accordance with matters upon which it remains silent;

19.2.4 To interpret the meaning and intentions of the constitution, which interpretation shall be final;

19.2.5 To co-opt to the executive committee, with full voting and other rights, such representatives of members as the executive committee shall deem to be in the best interests of the Association;

19.2.6 To establish any special committees or sub-committees and to determine their composition, functions, powers and method of operation and to dissolve or annul any or all appropriate/necessary;

19.2.7 To make such recommendations as it may deem fit for the imposition, in accordance with the provisions of Clause 15 hereof, of any additional subscription, levy or other monetary contribution;

19.2.8 To acquire, either by purchase, lease or otherwise, any movable or immovable property on behalf of the Association and to sell, let, mortgage, or otherwise deal with or dispose .

of any movvable or immovable property belonging to the Association provided that to immovable property shall be acquired, sold, mortgaged, let or leased, for a period longer than five (5) years, except unde the authority of a resolution passed at a general me ting.

19.2.9 To open, in the name of the Association, one or more baking accounts at such places as may be deemed fit, and to determine the necessary signing powers for su accounts;

19.2.10 Subject to the limitations of Clause 20.3 hereof, ini expenditure on behalf of the Association and to authorize payment in respect of same;

19.2.11 To lend or invest the funds of the Association or borrow money, for the benefit of the Association and furtherance of its stated objects, upon such terms ar conditions as may be deemed fit;

19.2.12 To have the custody of the funds and other property c the Association and to apply such funds to any purpos in connection with the furtherance or promotion of th Association's objectives;

19.2.13 To insure the property or interests of the Associatic against any risk;

19.2.14 To cause true accounts to be kept of the monies recei ved and expended by the Association, and of matters i respect of which such receipts and expenditure take place, and that assets, and balances of the Associati which shall be duly audited as provided for under this Constitution;

19.2.15 To engage, on behalf of the Association, consultants other persons from time to time such conditions and re muneration as may be deemed appropriate;

19.2.16 To institute, defend, abandon or compromise in the na of the Association, any actions or other proceedings;

19.2.17 On behalf of the Association, to act as arbitrators or to submit any dispute to arbitration;

19.2.18 Consistent with this Constitution, to regulate the serving of notice of and the form of procedure at, all meetings of the Association;

19.2.19 To carry out, subject to this Constitution, all other things conducive to the best interests of the Association.

19.3 Composition and Election

The executive Committee in which the authority and specific powe of the Association shall be vested in terms of Clause 21.1 and 21.2 hereof, shall consist of :-

19.3.1 The chairman, vice-chairman and four (4) other members, who shall be elected at the annual general meeting Association and who shall hold office until the

conclusion of the following annual general meeting and subject to the provisions of clause 19.5 not more than three (3) co-opted Members and;

19.3.2 Where, applicable in terms of Clause 18.7.1 hereof and subject to the conditions thereof, the immediate past Chairman ex officio.

19.4 Eligibility for Election

19.4.1 No representative of a member shall be a candidate for election to the executive committee unless:-

19.4.1.1. he is a director, manager or senior executive and;

19.4.1.2 a nomination form shall have been submited on his behalf, duly completed and correctly conveying such information as my from time to time be required by the Association and:-

19.4.1.3 his nomination shall have been supported by a proposer who shall be a member of the Association and;

19.4.1.4 he shall signified his willingness to serve on that committee;

Provided always that the executive committee shall have the sole right to decide the date by which the nomination form shall be returned to the Association, and, upon examination of the said form, to determine the eligibility or otherwise of the candidate for election.

19.4.2 Only one (1) representative of a member shall be eligible to serve on the executive committee at the same time.

19.4.3 Any member of the executive committee who ceases to be eligible to retain his membership of that committee or whshes to resign therefrom, shall forthwith tender his resignation from the committee which shall thereupon accept and record his resignation.-

19.5 Co-option

In the exercise of the powers conferred on it by clause 19.2.5 hereof, the executive committee may co-opt such members, not exceeding three (3), as may be deemed necessary in the interests of the Association or to fill vacancy provided that:-

19.5.1 The provision of Clause 19.4 regulating eligibility for election shall apply equally to co-opted members and;

19.5.2 Such a member shall serve only until the next general meeting following his co-option;

19.5.3 Notwithstanding the forngoing, a co-opted member so retiring shall be eligible for election in accordance with the provisions Clause 19.4 hereof.

19.6 Alternates

No alternates shall be appointed to any of the elected or co-opted members of the executive committee.

19.7 Chairman

19.7.1 No member or his representative shall occupy the office of chairman for more than two (2) years in sucssion, provided that for the year after he was vacated office he may be an additional member of the executive committee ex officio with full voting and other rights.

19.7.2 Nothing in the foregoing proviso shall preclude the retiring chairman form being nominated for re-election to the incoming executive committee immediately upon his vacating office provided that he shall not again be eligible for the chairmanship until the following annual general meeting.

19.7.3 Unless he shall be elected chairman, the provisions of sub.clauses 15.7.1 and 15.7.2 hereof, with the exception of the proviso to sub-clause 15.7.1 shall apply mutatis mutandis to the vice-chairman.

19.7.4 The chairman, or in his absence the vice-chairman, shall preside al all meetings of the executive commiittee, except that in the absence of them both the meeting shall elect a chairman, from amongst the committee members present, who shall preside at the meeting only.

19.7.5 The cheirman and vice-chairman shall be ex officio members of all special committees or sub-committees

19.8 Meetings

19.8.1 The executive committee shall meet as often as may be deemed necessary on such date, and at such time and place as the committee may decide, be convened by notice to members of the committee, served in the manner prescribed in Clause 16 hereof, at least seven (7) days prior to each meeting.

19.8.2 Notwithstanding the foregoing, meetings of the executive committee shall be convened:-

19.8.2.1 At the discretion of the chairman upon such notice and by such means as he may deem fit, and

19.8.2.2 Upon a resuisition, signed by not less than two members of that committee, lodged with the Association in sufficient time for proper notice to be served.

19.9 Quorum

19.9.1 Three (3) members of executive committee, personally present at a meeting of that committee shall constitute a quorum.

19.9.2 If within fifteen (15) minutes from the time appointed for the meeting a quorum is not present, the meeting shall stand adjourned to such other day and any such other time and place as the chairman amy determine, and, if at rhe adjourned meeting a quorum is not present within fifteen (15) minutes from the

time appointed for the meeting, the members present shall constitute a quorum.

19.10 Voting

A vote of the executive committee shall be taken on a show of hands, or at the discretion of the chairman by ballot, provided that:-

19.10.1 when such a vote is taken each member personally present shall be entitled to one (1) vote only, except that the chairman shall have, in addition to this deliberative vote, a casting vote in cases of equality of voting; and

19.10.2 any resolution put the vot shall, by majority of the votes taken, be deemed to have been passed or otherwise.

19.11 Invitation

The executive committee may, at its discretion, empower the Chairman to invite any person to attend and speak, but not to vote, at any meeting of the committee held during its electoral year.

19.12 Attendance

By virtue of his having accepted, through election or co-option, membership of the executive committee, each member shall be deemed to have obligated himself to attend all meetings of the committee with the exception of those meetings from which he shall previously have beem granted formal leave of absence or for which his apologies for non attendance shall have been accepted by the committee provided that, after due warning shall have given, the committee may:

19.12.1 at any time, for good cause shown, pass a resolution declaring a member to be a persistant absentee; and

19.12.1 the membership of any member so declared shall thereby be determinated.

19.13 Minutes

Each member of the Association shall be entitled to receive a copy of the minutes of every executive committee meeting on the understanding that such minutes are suhiect to amendment prior to their formal confirmation and adoption at the next meeting of that committee. All minutes of executive committee meetings shall remain confidential.

20 FINANCE

20.1 The financial year of the Association shall end on the 31st December.

20.2 All monies received by or on behalf of the Association sha. be paid to the credit of the Association in its banking account.

20.3 No single item of expenditure ~~in excess of~~ , other than secretarial fees paid in accordance with any agreement previously entered into by the

Association, shall be met from funds of Association unless such expenditure has the prior approval of the executive committee.

20.4 True account shall be kept of all monies and assets received and expended by the Association and the matter in respect of which such receipt and expenditure takes place, and of credits and liabilities of the Association.

20.5 At least once in every calendar year, a balance sheet and statement of income and expenditure shall be prepared which shall be audited an circulated to all members of the Association at least fourteen (14) days prior to the annual meeting

21 RECORDS

21.1 The executive committee shall ensure that adequate records of all proceedings of the Association are properly made and maintained, and all such records and other documents relating to the affairs of the Association are kept in safe custody.

22 ALTERATIONS TO THE CONSTITUTION

22.1 This constitution shall not be altered, added to or amended unless at least fourteen (14) days written notice of the terms of the proposed alteration, addition or ammendement shall have been adopted by a resolution or resolutions passed at special general meeting of the Association.

23 WINDING UP

The decision to wind up or dissolve the Association shall be made only by a resolution to that effect passed by a two-thirds majority of those personally present and entitled to vote at a general meeting of the Association convened specifically for that purpose, of which not less than fourteen (14) days notice shall have been given in accordance with clause 15 setting out the terms of the proposed resolution and the reasons therefor.

23.2 Every member of the Association shall contribute to the assets of the Association in the event of the same being wound up or dissolved during the time he is a member, or within one (1) year of the termination of his membership, for the payment of debts and liabilities of the Association contacted before the time at which his membership terminates, and the cost, charges and expenses of winding up the same for the adjustment of the rights of contributories amongst themselves, such amount as shall be required by resolution of the Association in general meeting, but not e ceeding in the agregate the total amount of the aforesaid debts, liabilities and costs of wind up.

23.3 If, upon winding up or dissolution of one the Association, there remains after the satisfaction of all its debts and liabilities, any property whatsoever, the same shall not be paid to or distributed amongst members of the Association, but shall be given or transferred to some other association or organization having objects similar to the objects of the Association, to be determined by members of the Association at or before the time of winding up or dissolution.

Annex C.5 Outline of IPM Seminar Held on August 10, 1993 at the Plant Protection Department (Depto. de Sanidade Vegetal), With List of Problems Faced by Plant Protection Officers in Southern Africa

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SEMINÁRIO PROTECÇÃO INTEGRADA

DEPARTAMENTO DA SANIDADE VEGETAL
Maputo, 10 de Agosto 1993

PROGRAMA

1. SITUAÇÃO DA SANIDADE VEGETAL NO PAÍS - Marina Pancas

2. PROTECÇÃO INTEGRADA, DEFINIÇÃO, NECESSIDADE E PROGRAMAS REALIZADAS NO PAÍS. - Marina Pancas

3. ALGUNS EXEMPLOS DE PROTECÇÃO INTEGRADA EM PAÍSES AFRICANOS; Estrangulamentos na implementação da PI nos países da África Central, de Leste e Austral
(Conclusões Seminário PI, Harare, Abril 1993)
Piet Segeren

INTERVALO

4. ANÁLISE DA SITUAÇÃO FITOSSANITÁRIA DALGUMAS CULTURAS NO PAÍS; - Piet Segeren

   - Trabalho em grupos:
     - algodão
     - citrinos
     - mandioca
     - milho/mapira
     - tomate/couve
     - pragas migratórias e ratos

5. PRESENTAÇÃO DAS CONCLUSÕES E RECOMENDAÇÕES DOS GRUPOS DE TRABALHO - Marina Pancas

COMBATE INTEGRADO

Outros nomes: Protecção integrada
Manejo integrado
Luta integrada

DEFINIÇÃO: COMBATE INTEGRADO é um conceito sobre o combate às pragas e doenças, baseado no SISTEMA ECOLÓGICO dos campos agrícolas, usando uma VARIEDADE DE MÉTODOS COMPETETÍVEIS no combate duma certa praga ou doença. (R.F.Smith)

PRINCÍPIOS:

1. No combate integrado baseia-se o próprio acto de combater nos níveis reais da densidade da população da praga ou doença, e o combate é apenas iniciado quando o nivel económico de ataque é atingido.

2. No combate integrado tenta-se de todas as maneiras poupar os inimigos naturais, como são os parasitas, os predadores e os patogénios das pragas e doenças, e mesmo favorecê-los.

3. Se fôr necessário usar pesticidas, são usados de maneira selectiva, e apenas quando o seu uso é económicamente e ecológicamente justificado.

OBJECTIVO: O objectivo último do combate integrado é para obter um rendimento óptimo, de alta qualidade, com um mínimo de custos, e tomando em consideração os aspectos ecológicos e sociológicos da zona agrícola, não só ao curto mas também ao longo prazo.

ESTRANGULAMENTOS NA IMPLEMENTAÇÃO DO CONCEITO DA PROTECÇÃO INTEGRADA NOS PAÍSES DA ÁFRICA CENTRAL, DE LESTE E AUSTRAL
(Conclusões do seminário de Harare, Abril 1993)
Piet Segeren, Marina Pancas

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* Falta de conhecimentos sobre o conceito da Protecção Integrada (PI) com os políticos, estruturas do Ministério de Agricultura, investigadores, extensionistas e agricultores.

* Falta de consciência dos perigos do uso de pesticidas no público em geral.

* Falta de conhecimentos sobre os efeitos secundários do uso de pesticidas, tanto para o Homem, como para o sistema agrícola e o meio ambiente.

* O conceito que os agricultores têm de "pesticidas".

* Falta de implementação e fiscalização da lei que regula o uso de pesticidas no país.

* Uma política - governamental e/ou dos doadores - de subsidiar pesticidas, o que estimula o uso anti-económico destes produtos.

* Falta duma estratégia clara do governo na área da Protecção das Plantas.

* Projectos mal concebidos que, ao longo prazo, não servem para melhorar a situação dos camponeses.

* Falta de fundos ou de continuidade no financiamento dos programas para desenvolver ou implementar PI.

* Falta de treino em técnicas necessárias para a implementação de PI com os agricultores, extensionistas e investigadores.

* Falta de treino em técnicas de comunicação com os extensionistas e investigadores, para poderem adquirir a participação activa dos agricultores em programas de implementação de PI.

* Falta de informação sobre PI ao lado da investigação e da extensão e de falta de troca de experiências entre elas.

* Falta de trabalho interdisciplinário, incluindo investigadores de vários disciplinas, extensionistas e agricultores.

* Falta de atenção para os aspectos sócio-económicos de combate às pragas, doenças e ervas daninhas.

* Falta de colaboração e coordenação entre instituições envolvidos no desenvolvimento de programas de PI.

* Os agricultores, em geral, não participam nas decisões sobre a política agrária e as prioridades na investigação.

* Os agricultores também não participam na investigação agrícola 'oficial', nem são treinados para melhorar os seus próprios métodos de investigação.

* Não se aproveita suficientemente dos conhecimentos dos agricultores quando se faz investigação agrícola.

* Falta de participação das mulheres em todo o processo de desenvolvimento e implementação da PI.

* Falta de estímulos para investigadores na PI; em geral é mais atractivo trabalhar na área do combate químico.

ANNEX D. PERTINENT U.S. AND INTERNATIONAL INFORMATION ON PESTICIDES

Annex D. 1 List of Pesticides Presently Designated as Restricted Use by the U.S. EPA Office of Pesticide Programs (dated Sept. 1993).

Annex D.2 List of Pesticides Banned and Severely Restricted in the United States (1992): List Submitted by USEPA to FAO's Prior Informed Consent (PIC) List.

Annex D.3 Fax from the U.S. EPA Office of Pesticide Programs on Registered Biochemically Active Ingredients (Insecticides, etc.).

Annex D.4 Fax from the Bio-Integral Resource Center on Botanical Pesticides Registered in the U.S.

Annex D.5 "Chapter 19": "Environmentally Sound Management of Toxic Chemicals, Including Prevention of Illegal International Traffic in Toxic and Dangerous Products"--a collaborative program on chemical safety among the United Nations Environment Programme (UNEP), the International Labour Organisation (ILO), and the World Health Organisation (WHO), in the International Programme on Chemical Safety (IPCS). This is one of the two major agenda items of the Comissao Naçional do Ambiente (CNA).

Annex D. 1 List of Pesticides Presently Designated as Restricted Use by the U.S. EPA Office of Pesticide Programs (dated Sept. 1993)

PESTICIDE INFORMATION NETWORK

RESTRICTED USE PRODUCTS FILE
September, 1993

EPA.CODE..	CHEM.NAME.....	REV.DATE
000701	ACROLEIN	11-30-89
000601	ACRYLONITRILE	12-01-90
090501	ALACHLOR	10-01-92
098301	ALDICARB	09-01-93
068401	ALLYL ALCOHOL	11-30-89
117101	ALPHA-CHLOROHYDRIN	07-01-93
066501	ALUMINUM PHOSPHIDE	06-01-92
106201	AMITRAZ	04-01-90
004401	AMITROLE	07-01-93
006801	ARSENIC ACID	03-01-91
006802	ARSENIC PENTOXIDE	03-01-93
080803	ATRAZINE	09-01-93
122804	AVERMECTIN	03-01-90
069201	AVITROL	03-01-93
058001	AZINPHOS-METHYL	08-01-93
105201	BENDIOCARB	03-30-92
128825	BIPHENTHRIN	05-01-91
083001	BIS(TRIBUTYLTIN) OXIDE	04-01-93
112701	BRODIFACOUM	11-30-89
035302	BROMOXYNIL	07-01-93
012902	CADMIUM CHLORIDE	09-01-91
074001	CALCIUM CYANIDE	11-30-89
090601	CARBOFURAN	06-01-91
016501	CARBON TETRACHLORIDE	07-01-92
058201	CHLORDANE	07-01-93
059701	CHLORDIMEFORM	11-30-89
084101	CHLORFENVINPHOS	03-01-90
028801	CHLOROBENZILATE	11-30-89
067707	CHLOROPHACINONE	04-01-90
081501	CHLOROPICRIN	03-01-93
059101	CHLORPYRIFOS	06-01-93
021101	CHROMIC ACID	11-01-92
125501	CLOFENTEZINE	08-01-91
022003	COAL TAR	04-01-90
025004	COAL TAR CREOSOTE	05-01-93
036501	COUMAPHOS	07-01-93
025002	CREOSOTE	11-30-89
025003	CREOSOTE OIL	03-01-91
100101	CYANAZINE	05-01-93
043401	CYCLOHEXIMIDE	03-01-90
128831	CYFLUTHRIN	07-01-93
128867	CYHALOTHRIN	07-01-93
109702	CYPERMETHRIN	07-01-93
011301	DBCP	11-30-89

		01-01-90
057601	DEMETON	11-30-89
078801	DIALLATE	11-01-92
029001	DICHLOROPROPENE	04-01-90
110902	DICLOFOP METHYL	11-01-91
035201	DICROTOPHOS	08-01-92
108201	DIFLUBENZURON	11-01-91
037801	DIOXATHION	11-01-91
032501	DISULFOTON	04-01-90
110401	DODEMORPH	07-01-92
041601	ENDRIN	03-01-91
041801	EPN	01-01-90
058401	ETHION	06-01-93
041101	ETHOPROP	03-01-93
057501	ETHYL PARATHION	07-01-93
042002	ETHYLENE DIBROMIDE	09-01-90
100601	FENAMIPHOS	03-01-93
105901	FENITROTHION	06-01-93
127901	FENPROPATHRIN	11-01-91
032701	FENSULFOTHION	04-01-93
053301	FENTHION	03-01-93
109301	FENVALERATE	04-01-91
118301	FLUCYTHRINATE	11-30-89
075002	FLUOROACETAMIDE	07-01-93
109302	FLUVALINATE	04-01-90
041701	FONOFOS	11-30-89
045801	HYDROCYANIC ACID	11-30-89
126901	ISAZOFOS	03-01-91
109401	ISOFENPHOS	07-01-93
128897	LAMBDA-CYHALOTHRIN	07-01-93
009001	LINDANE	11-01-91
066504	MAGNESIUM PHOSPHIDE	11-30-89
101201	METHAMIDOPHOS	03-01-91
100301	METHIDATHION	05-01-93
100501	METHIOCARB	07-01-92
090301	METHOMYL	07-01-93
053201	METHYL BROMIDE	04-01-90
068103	METHYL ISOTHIOCYANATE	03-01-93
053501	METHYL PARATHION	01-01-93
015801	MEVINPHOS	03-01-91
058901	MONOCROTOPHOS	07-01-93
077401	NICLOSAMIDE	03-01-93
056702	NICOTINE	04-01-90
128934	NITROGEN, LIQUID	02-01-90
103801	OXAMYL	09-01-92
058702	OXYDEMETON METHYL	12-01-92
061601	PARAQUAT	01-01-93
063001	PENTACHLOROPHENOL	11-01-92
063003	PENTACHLOROPHENOL, SODIUM SALT	03-01-93
109701	PERMETHRIN	06-01-93
057201	PHORATE	03-01-91
018501	PHOSACETIM	03-01-91
097701	PHOSALONE	

018201	PHOSPHAMIDON	11-01-92*
005101	PICLORAM	07-01-93
005103	PICLORAM, ISOOCTYL ESTER	03-01-91
005104	PICLORAM, POTASSIUM SALT	05-01-91
005102	PICLORAM, TRIIOSOPROPANOLAMINE SALT	07-01-93
063002	POTASSIUM PENTACHLOROPHENATE	11-30-89
111401	PROFENOPHOS	11-30-89
101701	PRONAMIDE	08-01-92
113601	PROPETAMPHOS	03-01-90
097801	RESMETHRIN	06-01-93
071003	ROTENONE	07-01-93
109303	S-FENVALERATE	06-01-90
013505	SODIUM ARSENATE	11-30-89
074002	SODIUM CYANIDE	11-01-91
068304	SODIUM DICHROMATE	03-01-92
075003	SODIUM FLUOROACETATE	04-01-90
075603	SODIUM HYDROXIDE	05-01-91
039003	SODIUM METHYLDITHIOCARBAMATE	03-01-92
013401	SODIUM PYROARSENATE	03-01-91
009901	STARLICIDE	07-01-93
076901	STRYCHNINE	03-01-92
079501	SULFOTEPP	11-30-89
078001	SULFURIC ACID	09-01-93
078003	SULFURYL FLUORIDE	10-01-90
111501	SULPROFOS	11-30-89
128912	TEFLUTHRIN	02-01-90
079601	TEPP	11-30-89
105001	TERBUFOS	11-30-89
079084	TERGITOL	08-01-93
036201	TFM	04-01-90
080501	TOXAPHENE	07-01-93
121501	TRALOMETHRIN	11-01-92
083112	TRIBUTYLTIN FLUORIDE	08-01-93
083120	TRIBUTYLTIN METHACRYLATE	08-01-93
083601	TRIPHENYLTIN HYDROXIDE	07-01-93
088601	ZINC PHOSPHIDE	09-01-93

132 Records Processed

Annex D.2 List of Pesticides Banned and Severely Restricted in the United States (1992): List Submitted by USEPA to FAO's Prior Informed Consent (PIC) List

LIST OF PESTICIDES BANNED AND SEVERELY RESTRICTED

IN THE UNITED STATES

A "Banned" pesticide is defined as a pesticide for which all registered uses have been prohibited by final government action, or for which all requests for registration or equivalent action for all uses have, for health or environmental reasons, not been granted.

BANNED

1. aldrin
2. benzene hexachloride [BHC] (vol. cancellation)
3. 2,3,4,5-Bis(2-butylene)tetrahydro-2-furaldehyde [Repellent-11]
4. bromoxynil butyrate (vol. cancellation)
5. cadmium compounds (vol. cancellation)
6. calcium arsenate (vol. cancellation)
7. captafol (vol. cancellation)
8. carbon tetrachloride
9. chloranil (vol. cancellation)
10. chlordimeform (vol. cancellation)
11. chlorinated camphene [Toxaphene] (vol. cancellation)
12. chlorobenzilate (vol. cancellation)
13. chloromethoxypropylmercuric acetate [CPMA]
14. copper arsenate (vol. cancellation)
15. cyhexatin (vol. cancellation)
16. DBCP
17. decachlorooctahydro-1,3,4-metheno-2H-cyclobuta(cd) pentalen-2-one [chlordecone]
18. DDT
19. dieldrin
20. dinoseb and salts
21. Di(phenylmercury)dodecenylsuccinate [PMDS] (vol. cancellation)
22. endrin (vol. cancellation)
23. EPN (vol. cancellation)
24. ethyl hexyleneglycol [6-12] (vol. cancellation)
25. hexachlorobenzene [HCB] (vol. cancellation)
26. lead arsenate (vol. cancellation)
27. leptophos (Never received initial registration)
28. mirex (vol. cancellation)
29. monocrotophos (vol. cancellation)
30. nitrofen (TOK) (vol. cancellation)
31. OMPA (octamethylpyrophosphoramide)
32. phenylmercuric oleate [PMO] (vol. cancellation)
33. potassium 2,4,5-trichlorophenate [2,4,5-TCP]
34. pyriminil [Vacor] (vol. cancellation)
35. safrole (vol. cancellation)
36. silvex
37. sodium arsenite

38. TDE (vol. cancellation)
39. Terpene polychlorinated [Strobane] (vol. cancellation)
40. thallium sulfate
41. 2,4,5-Trichlorophenoxyacetic acid [2,4,5-T]
42. vinyl chloride

A "Severely Restricted" pesticide means a pesticide for which virtually all registered uses have been prohibited by final government regulatory action, but for which certain specific registered use or uses remain authorized.

SEVERELY RESTRICTED

1. arsenic trioxide
2. carbofuran (vol. cancellation)
3. chlordane
4. daminozide (vol. cancellation)
5. EDB
6. heptachlor
7. mercurous chloride
8. mercuric chloride
9. phenylmercury acetate [PMA]
10. sodium arsenate
11. tributyltin compounds

Annex D.3 Fax from the U.S. EPA Office of Pesticide Programs on Registered Biochemically Active Ingredients (Insecticides. . etc.)

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United States Environmental Protection Agency
Washington, D.C. 20460

Office of Prevention, Pesticides and Toxic Substances
Office of Pesticide Programs
Policy and Special Projects Staff

Fax Number: (703) 305-6244

FAX COVERSHEET

To:

Name:	Herb Fisher
Of:	
Fax Phone Number:	503-758-4514
Office Phone Number:	503-752-5449

From:

Name:	[redacted]
Office phone number:	(703) 305-7102
Office room number:	1119 CM-2
Mail Code:	H7501C

Description:
Number of pages (including this cover sheet):

Comments/Special Instructions:
Attached are some lists of biochemical active ingredients registered as of June, 1993 (which was the date we testified before Congress on a host of registration issues). Also attached are a list of microbial pesticides. You can take this list and look in the 40 Code of Federal Regulations Part 180, Tolerance Index and determine on which crops they are approved for use. It is my understanding that for the most part biologicals and botanicals are exempted from the need for tolerances, but this determination is done on a case by case basis, and the tolerance petitioner must request a data waiver. Phil Hutton is the product manager for biological insecticides. You may also speak with Cynthia Giles-Parker (703-305-5540) who is the product manager for any biological herbicides or fungicides. I hope you find this information helpful to your report. I would be very interested in a copy upon completion.

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Table I. Biochemical Active Ingredients

Chemical Name	Target Pest(s)
I. Pheromones	
Dodecenyl Acetates, Aldehydes, Alcohols, and Isomers	Grape Berry Moth Western Pine Shoot Borer, Codling Moth Oriental Fruit Moth
Isomers of Trimethyl Dodecatriene	Tetranychid Mite Aphids
Hexadecanyl Acetates, Aldehydes, Alcohols, and Isomers	Pink Bollworm Artichoke Plume Moth
(Z)-9-Tricosene	Housefly
(R,Z)-5-(1-Decenyl)dihydro-2-(3)-furanone	Japanese Beetle
Octadecadienyl Acetates	Peachtree Borer
Periplanone B	American Cockroach
Tridecenyl Acetates, Aldehydes, and Isomers	Tomato Pinworm Tobacco Budworm Cotton Bollworm
Tetradecenyl Acetate	Grape Berry Moth
II. Plant Growth Regulators	
Streptomyces Fermentation By-Product	Various Ornamental
N-6-Benzyladenine	Plants and Food
Natural Plant Extracts Containing Gibberellins, Zeatins, IAA	Crops
Cytokinin (6-Furfural(amino)purine)	
Ethylene	
Gibberellins and Salts	
Indole-3-Butyric Acid	
Kenatine	
III. Floral Lures/Attractants/Repellents	
[redacted]	Insects, Dog, Bird
Cedar Leaf Oil	Rodents
Cinnamon	Roaches
Dried Blood	Rabbits, Dogs
Eugenol (2-Methyl-4-(2-propenyl) phenol)	Japanese Beetle
[redacted]	Birds
Methyl Anthranilate	Birds
Oil of Citronella	Mosquitoes, Ticks
Oil of Geranium	Japanese Beetle

3. (continued)	
Putrescent Whole Egg Solids	Big Game Animals
Rhodinol	Not Specified
Terpineol	Insects
Natural Insect Regulators	
Trimethyl-dodecadienoates	Roaches
Hydroprene	Whiteflies, Aphids, Scales, Gnats
Kinoprene	Mosquitoes, Hornflies
Methoprene	[redacted]
[redacted]	
Other	Fungi
Volatile Sulfur Components	Insects, Mites
Cellulose Gum	Mites
Vegetable Oil	

TABLE 1. EPA CURRENTLY REGISTERED MICROBIAL PESTICIDES

MICROBIAL ACTIVE INGREDIENT	YEAR REGISTERED	NUMBER REGISTERED	PEST/DISEASE CONTROLLED
Bacteria			
1. *Bacillus popilliae* + *B. lentimorbus*	1948	5	Japanese beetle larvae
2. *Bacillus thuringiensis* subsp. *kurstaki*	1961[1]	136	Lepidopteran larvae
3. *Agrobacterium radiobacter*	1979	2	Crown gall disease
4. *B. thuringiensis* subsp. *israelensis*	1981	27	Lepidopteran larvae
5. *B. thuringiensis* var. *san diego*[2]	1988	1	Coleopteran larvae
6. *B. thuringiensis* subsp. *tenebrionis*	1988	6	Coleopteran larvae
7. *Pseudomonas fluorescens*	1988	5	*Pythium*, *Rhizoctonia*, and frost inhibition by competition
8. *B. thuringiensis* subsp. *kurstaki* strain EG 2348	1989	1	Lepidopteran larvae
9. *B. thuringiensis* subsp. *kurstaki* strain EG 2424	1989	1	Lepidopteran/Coleopteran larvae
10. *B. thuringiensis* subsp. *kurstaki* strain EG 2371	1990	2	Lepidopteran larvae
11. *Bacillus sphaericus*	1991	1	Diptera larvae
12. *Bacillus subtilis* GB03	1992	2	Damping off disease
13. *B. thuringiensis* subsp. *aizawai* strain GC-91	1992	2	Lepidopteran larvae
14. *B. thuringiensis* subsp. *aizawai*	1992	2	Lepidopteran larvae
15. *Pseudomonas syringae*[3]	1992	2	Frost inhibition by competition
Fungi			
16. *Phytophthora cinnamomi*	1981	1	Cirrus strangler vine
17. *Collatotrichum gloeosporioides*	1982	1	Northern joint vetch
18. *Trichoderma harzianum* (ATCC 20476)[4]	1989	1	Tree wound decay
19. *Trichoderma polysporum* (ATCC 20475)[4]	1989	1	Wood rot
20. *Gliocladium virens* G-21	1990	2	*Pythium*, *Rhizoctonia*
21. *Trichoderma harzianum* Rifai strain KRL-AG2	1990	2	Damping off disease
22. *Lagenidium giganteum*	1991	3	Mosquito larvae
Protozoa			
23. *Nosema locustae*	1980	4	Grasshoppers
Viruses			
24. Polyhedral inclusion bodies of *Heliothis zeapolyhedrosis* virus (NPV)	1975	1	Cotton bollworm, budworm
25. Polyhedral inclusion bodies of Douglas fir tussock moth NPV	1976	1	Douglas fir tussock moth larvae
26. Polyhedral inclusion bodies of gypsy moth NPV	1978	2	Gypsy moth larvae
27. Polyhedral inclusion bodies of Pine sawfly NPV	1983	1	Pine sawfly larvae

[1] *Bacillus thuringiensis* subsp. *thuringiensis* was registered in 1961 and was replaced by subsp. *kurstaki* in 1970.
[2] The taxonomic designation for the microbial pesticide *B. thuringiensis* var. *san diego* is *B. thuringiensis* subsp. *tenebrionis*.
[3] One registered product is sold in combination with *Pseudomonas fluorescens*.
[4] *Trichoderma harzianum* (ATCC 20476) and *Trichoderma polysporum* (ATCC 20475) are always sold and used in combination.

To date in 4 additional microbia registratio

Annex D.4 Fax from the Bio-Integral Resource Center on Botanical Pesticides Registered in the U.S.

3 • I • R • C
The Bio-Integral Resource Center
P.O. Box 7414, Berkeley, CA 94707
415/524-2567 • Fax 415/524-1758

DATE: 9/22/93

TO: Herb Fisher 503-758-[illegible]514

FROM: [redacted]

RE: Botanical Pesticides Registered in U.S.

Sorry for the delay in getting back to you, but we are swamped with work. If there ever comes a day when we have an AID contract, we can give you priority attention.

The only botanicals on your list registered in the U.S. are listed below, with manufacturers:

Botanical	Product Name	Manufacturer
1. Neem *Azadirachta indica*	Margosan-O®	Grace Sierra Chemical Co. PO Box 4003 Milpitas, CA 95035 408/492-8255 Fax 408/262-9340
	Azatin®	AgriDyne Technologies, Inc. Salt Lake City, Utah 801/583-3500
	Bioneem®	Brunger Corp. 9555 Valley View Rd., Eden Prarie, MN 55344-3565 800/423-7544; Fax 612/941-5036
2. Nicotine	Black Leaf 40®	Wilbour Ellis Co. 320 California St. San Francisco, CA 94104 415/772-4000; Fax 415/772-4011
3. Allium sativum	Guardian Spray® ENVIRepel®	Guardian Spray Corp. PO Box 40121 Bakersfield, CA 93384 90505/323-4412
	Garlic Barrier®	Garlic Research Labs 25550 Wilshire Blvd., Suite 200 Loose Angeles, CA 90010 213/386-5900

Pyrethrin is also registered, although not on your list. Others botanicals registered are sabadilla, and ryannia.

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Annex D.5 "Chapter 19": "Environmentally Sound Management of Toxic Chemicals, Including Prevention of Illegal International Traffic in Toxic and Dangerous Products"--a collaborative program on chemical safety among the United Nations Environment Programme (UNEP), the International Labour Organisation (ILO), and the World Health Organisation (WHO), in the International Programme on Chemical Safety (IPCS). This is one of the two major agenda items of the Comissao Naçional do Ambiente (CNA)

Chapter 19

Environmentally sound management of toxic chemicals, including prevention of illegal international traffic in toxic and dangerous products

INTRODUCTION

19.1. A substantial use of chemicals is essential to meet the social and economic goals of the world community and today's best practice demonstrates that they can be used widely in a cost-effective manner and with a high degree of safety. However, a great deal remains to be done to ensure the environmentally sound management of toxic chemicals, within the principles of sustainable development and improved quality of life for humankind. Two of the major problems, particularly in developing countries, are (a) lack of sufficient scientific information for the assessment of risks entailed by the use of a great number of chemicals, and (b) lack of resources for assessment of chemicals for which data are at hand.

19.2. Gross chemical contamination, with grave damage to human health, genetic structures and reproductive outcomes, and the environment, has in recent times been continuing within some of the world's most important industrial areas. Restoration will require major investment and development of new techniques. The long-range effects of pollution, extending even to the fundamental chemical and physical processes of the Earth's atmosphere and climate, are becoming understood only recently and the importance of those effects is becoming recognized only recently as well.

19.3. A considerable number of international bodies are involved in work on chemical safety. In many countries work programmes for the promotion of chemical safety are in place. Such work has international implications, as chemical risks do not respect national boundaries. However, a significant strengthening of both national and international efforts is needed to achieve an environmentally sound management of chemicals.

19.4. Six programme areas are proposed:

(a) Expanding and accelerating international assessment of chemical risks;

(b) Harmonization of classification and labelling of chemicals;

(c) Information exchange on toxic chemicals and chemical risks;

(d) Establishment of risk-reduction programmes;

(e) Strengthening of national capabilities and capacities for management of chemicals;

(f) Prevention of illegal international traffic in toxic and dangerous products.

In addition, the short final subsection G deals with the enhancement of cooperation related to several programme areas.

19.5. The six programme areas are together dependent for their successful implementation on intensive international work and improved coordination of current international activities, as well as on the identification and application of technical, scientific, educational and financial means, in particular for developing countries. To varying degrees, the programme areas involve hazard assessment (based on the intrinsic properties of chemicals), risk assessment (including assessment of exposure), risk acceptability and risk management.

19.6. Collaboration on chemical safety between the United Nations Environment Programme (UNEP), the International Labour Organisation (ILO) and the World Health Organization (WHO) in the International Programme on Chemical Safety (IPCS) should be the nucleus for international cooperation on environmentally sound management of toxic chemicals. All efforts should be made to strengthen this programme. Cooperation with other programmes, such as those of the Organisation for Economic Cooperation and Development (OECD) and the European Communities (EC) and other regional and governmental chemical programmes, should be promoted.

19.7. Increased coordination of United Nations bodies and other international organizations involved in chemicals assessment and management should be further promoted. Within the framework of IPCS, an intergovernmental meeting, convened by the Executive Director of UNEP, was held in London in December 1991 to further explore this matter (see paras. 19.76 and 19.77).

19.8. The broadest possible awareness of chemical risks is a prerequisite for achieving chemical safety. The principle of the right of the community and of workers to know those risks should be recognized. However, the right to know the identity of hazardous ingredients should be balanced with industry's right to protect confidential business information. (Industry, as referred to in this chapter, shall be taken to include large industrial enterprises and transnational corporations as well as domestic industries.) The industry initiative on responsible care and product stewardship should be developed and promoted. Industry should apply adequate standards of operation in all countries in order not to damage human health and the environment.

19.9. There is international concern that part of the international movement of toxic and dangerous products is being carried out in contravention of existing national legislation and international instruments, to the detriment of the environment and public health of all countries, particularly developing countries.

19.10. In resolution 44/226 of 22 December 1989, the General Assembly requested each regional commission, within existing resources, to contribute to the prevention of the illegal traffic in toxic and dangerous products and wastes by monitoring and making regional assessments of that illegal traffic and its environmental and health implications. The Assembly also requested the regional commissions to interact among themselves and to cooperate with the United Nations Environment Programme, with a view to maintaining efficient and coordinated monitoring and assessment of the illegal traffic in toxic and dangerous products and wastes.

PROGRAMME AREAS

A. Expanding and accelerating international assessment of chemical risks

19.11. Assessing the risks to human health and the environment hazards that a chemical may cause is a prerequisite to planning for its safe and beneficial use. Among the approximately 100,000 chemical substances in commerce and the thousands of substances of natural origin with which human beings come into contact, many appear as pollutants and contaminants in food, commercial products and the various environmental media. Fortunately, exposure to most chemicals (some 1,500 cover over 95 per cent of total world production) is rather limited, as most are used in very small amounts. However, a serious problem is that even for a great number of chemicals characterized by high-volume production, crucial data for risk assessment are often lacking. Within the framework of the OECD chemicals programme such data are now being generated for a number of chemicals.

19.12. Risk assessment is resource-intensive. It could be made cost-effective by strengthening international cooperation and better coordination, thereby making the best use of available resources and avoiding unnecessary duplication of effort. However, each nation should have a critical mass of technical staff with experience in toxicity testing and exposure analysis, which are two important components of risk assessment.

Objectives

19.13. The objectives of this programme area are:

(a) To strengthen international risk assessment. Several hundred priority chemicals or groups of chemicals, including major pollutants and contaminants of global significance, should be assessed by the year 2000, using current selection and assessment criteria;

(b) To produce guidelines for acceptable exposure for a greater number of toxic chemicals, based on peer review and scientific consensus distinguishing between health- or environment-based exposure limits and those relating to socio-economic factors.

Activities

(a) Management-related activities

19.14. Governments, through the cooperation of relevant international organizations and industry, where appropriate, should:

(a) Strengthen and expand programmes on chemical risk assessment within the United Nations system IPCS (UNEP, ILO, WHO) and the Food and Agriculture Organization of the United Nations (FAO), together with other organizations, including the Organisation for Economic Cooperation and Development (OECD), based on an agreed approach to data-quality assurance, application of assessment criteria, peer review and linkages to risk management activities, taking into account the precautionary approach;

(b) Promote mechanisms to increase collaboration among Governments, industry, academia and relevant non-governmental organizations involved in the various aspects of risk assessment of chemicals and related processes, in particular the promoting and coordinating of research activities to improve understanding of the mechanisms of action of toxic chemicals;

(c) Encourage the development of procedures for the exchange by countries of their assessment reports on chemicals with other countries for use in national chemical assessment programmes.

(b) Data and information

19.15. Governments, through the cooperation of relevant international organizations and industry, where appropriate, should:

(a) Give high priority to hazard assessment of chemicals, that is, of their intrinsic properties as the appropriate basis for risk assessment;

(b) Generate data necessary for assessment, building, inter alia, on programmes of IPCS (UNEP, WHO, ILO), FAO, OECD and EC and on established programmes other regions and Governments. Industry should participate actively.

19.16. Industry should provide data for substances produced that are needed specifically for the assessment of potential risks to human health and the environment. Such data should be made available to relevant national competent authorities and international bodies and other interested parties involved in hazard and risk assessment, and to the greatest possible extent to the public also, taking into account legitimate claims of confidentiality.

(c) International and regional cooperation and coordination

19.17. Governments, through the cooperation of relevant international organizations and industry, where appropriate, should:

(a) Develop criteria for priority-setting for chemicals of global concern with respect to assessment;

(b) Review strategies for exposure assessment and environmental monitoring to allow for the best use of available resources, to ensure compatibility of data and to encourage coherent national and international strategies for that assessment.

Means of implementation

(a) Financial and cost evaluation*

[19.18. Most of the data and methods for chemical risk assessment are generated in the developed countries and an expansion and acceleration of the assessment work will call for a considerable increase in research and safety testing by industry and research institutions. The cost projections address the needs to strengthen the capacities of relevant United Nations bodies and are based on current experience in IPCS. It should be noted that there are considerable costs, often not possible to quantify, that are not included. These comprise costs to industry and Governments of generating the safety data underlying the assessments and costs to Governments of providing background documents and draft assessment statements to IPCS, the International Register of Potentially Toxic Chemicals (IRPTC) and CEC. They also include the cost of accelerated work in non-United Nations bodies such as OECD and EC.

19.19. The estimated international costs, about $30 million annually, are based on the assumption that a complete evaluation of 500 chemicals will be made in the period 1993-2000.]

(b) Scientific and technological means

19.20. Major research efforts should be launched in order to improve methods for assessment of chemicals as work towards a common framework for risk assessment and to improve procedures for using toxicological and epidemiological data to predict the effects of chemicals on human health and the environment, so as to enable decision makers to adopt adequate policies and measures to reduce risks posed by chemicals.

19.21. Activities include:

(a) Strengthening research on safe/safer alternatives to toxic chemicals that pose an unreasonable and otherwise unmanageable risk to the environment or human health and to those that are toxic, persistent and bio-accumulative and that cannot be adequately controlled;

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* These paragraphs contain matters relating to means of implementation, including cost estimates, which are indicative secretariat figures provided pursuant to Preparatory Committee decision 3/2. They remain in brackets as they have not been negotiated.

(b) Promotion of research on, and validation of, methods constituting a replacement for those using test animals (thus reducing the use of animals for testing purposes);

(c) Promotion of relevant epidemiological studies with a view to establishing a cause-and-effect relationship between exposure to chemicals and the occurrence of certain diseases;

(d) Promotion of ecotoxicological studies with the aim of assessing the risks of chemicals to the environment.

(c) Human resource development

19.22. International organizations, with the participation of Governments and non-governmental organizations, should launch training and education projects involving women and children, who are at greatest risk, in order to enable countries, and particularly developing countries, to make maximum national use of international assessments of chemical risks.

(d) Capacity-building

19.23. International organizations, building on past, present and future assessment work, should support countries, particularly developing countries, in developing and strengthening risk assessment capabilities at national and regional levels to minimize, and as far as possible control and prevent, risk in the manufacturing and use of toxic and hazardous chemicals. Technical cooperation and (financial)* support or other contributions should be given to activities aimed at expanding and accelerating the national and international assessment and control of chemical risks to enable the best choice of chemicals.

B. Harmonization of classification and labelling of chemicals

Basis for action

19.24. Adequate labelling of chemicals and the dissemination of safety data sheets such as ICSCs (International Chemical Safety Cards) and similarly written materials, based on assessed hazards to health and environment, are the simplest and most efficient way of indicating how to handle and use chemicals safely.

19.25. For the safe transport of dangerous goods, including chemicals, a comprehensive scheme elaborated within the United Nations system is in current use. This scheme mainly takes into account the acute hazards of chemicals.

19.26. Globally harmonized hazard classification and labelling systems are not yet available to promote the safe use of chemicals, inter alia, at the workplace or in the home. Classification of chemicals can be made for

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different purposes and is a particularly important tool in establishing labelling systems. There is a need to develop harmonized hazard classification and labelling systems, building on ongoing work.

Objectives

19.27. A globally harmonized hazard classification and compatible labelling system, including material safety data sheets and easily understandable symbols, should be available, if feasible, by the year 2000.

Activities

(a) Management-related activities

19.28. Governments, through the cooperation of relevant international organizations and industry, where appropriate, should launch a project with a view to establishing and elaborating a harmonized classification and compatible labelling system for chemicals for use in all United Nations official languages including adequate pictograms. Such a labelling system should not lead to the imposition of unjustified trade barriers. The new system should draw on current systems to the greatest extent possible; it should be developed in steps and should address the subject of compatibility with labels of various applications.

(b) Data and information

19.29. International bodies including, inter alia, IPCS (UNEP, ILO, WHO), FAO, the International Maritime Organization (IMO), the United Nations Committee of Experts on the Transport of Dangerous Goods and OECD, in cooperation with regional and national authorities having existing classification and labelling and other information-dissemination systems, should establish a coordinating group to:

(a) Evaluate and, if appropriate, undertake studies of existing hazard classification and information systems to establish general principles for a globally harmonized system;

(b) Develop and implement a work plan for the establishment of a globally harmonized hazard classification system. The plan should include a description of the tasks to be completed, deadline for completion and assignment of tasks to the participants in the coordinating group;

(c) Elaborate a harmonized hazard classification system;

(d) Draft proposals for standardization of hazard communication terminology and symbols in order to enhance risk management of chemicals and facilitate both international trade and translation of information into the end-user's language;

(e) Elaborate a harmonized labelling system.

Means of implementation

(a) Financial and cost evaluation*

[19.30. A step-by-step international cooperative approach to harmonizing the main existing systems, with subsequent or concurrent adoption of the resulting system, wholly or in part, by all member States before the year 2000, would limit additional costs for the work required to reconcile these systems and for assistance to developing countries in implementing compatible classification and labelling schemes. Around $3 million would be needed annually to strengthen the capacities of international organizations to coordinate the work of harmonization. Additional costs for technical assistance to strengthen national capacities related to work to be undertaken under this programme area are included in the costing of programme area E.

19.31. The benefits from these expenditures would far exceed the costs.]

(b) Human resource development

19.32. Governments and institutions and non-governmental organizations, with the collaboration of appropriate organizations and programmes of the United Nations, should launch training courses and information campaigns to facilitate the understanding and use of a new harmonized classification and compatible labelling system for chemicals.

(c) Capacity-building

19.33. In strengthening national capacities for management of chemicals, including development and implementation of, and adaptation to, new classification and labelling systems, the creation of trade barriers should be avoided and the limited capacities and resources of a large number of countries, particularly developing countries, for implementing such systems, should be taken into full account.

C. Information exchange on toxic chemicals and chemical risks

Basis for action

19.34. The following activities, related to information exchange on the benefits as well as the risks associated with the use of chemicals, are aimed at enhancing the sound management of toxic chemicals through the exchange of scientific, technical, economic and legal information.

19.35. The London Guidelines for the Exchange of Information on Chemicals in International Trade are a set of guidelines adopted by Governments with a view to increasing chemical safety through the exchange of information on chemicals. Special provisions have been included in the guidelines with regard to the exchange of information on banned and severely restricted chemicals.

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19.36. The export to developing countries of chemicals that have been banned or producing countries or whose use has been severely restricted in some industrialized countries has been the subject of concern, as some importing countries lack the ability to ensure safe use, owing to inadequate infrastructure for controlling the importation, distribution, storage, formulation and disposal of chemicals.

19.37. In order to address this issue, provisions for Prior Informed Consent (PIC) procedures were introduced in 1989 in the London Guidelines (UNEP) amend in the International Code of Conduct on the Distribution and Use of Pesticides (FAO). In addition a joint FAO/UNEP programme has been launched for the operation of the PIC procedures for chemicals, including the selection of chemicals to be included in the PIC procedure and preparation of PIC decision guidance documents. The ILO chemicals convention calls for communication between exporting and importing countries when hazardous chemicals have been prohibited for reasons of safety and health at work. Within the General Agreement on Tariffs and Trade (GATT) framework, negotiations have been pursued with a view to creating a binding instrument on products banned or severely restricted in the domestic market. Further, the GATT Council has agreed, as stated in its decision contained in C/M/25, to extend the mandate of the working group for a period of three months, to begin from the date of the group's next meeting, and has authorized the Chairman to hold consultations on timing with respect to convening this meeting.

19.38. Notwithstanding the importance of the PIC procedure, information exchange on all chemicals is necessary.

Objectives

19.39. The objectives of this programme area are:

(a) To promote intensified exchange of information on chemical safety, use and emissions among all involved parties;

(b) To achieve by the year 2000, as feasible, full participation in and implementation of the PIC procedure, including possible mandatory applications through legally binding instruments contained in the Amended London Guidelines and in the FAO International Code of Conduct, taking into account the experience gained within the PIC procedure.

Activities

(a) Management-related activities

19.40. Governments and relevant international organizations with the cooperation of industry should:

(a) Strengthen national institutions responsible for information exchange on toxic chemicals and promote the creation of national centres where these centres do not exist;

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(b) Strengthen international institutions and networks, such as IRPTC, responsible for information exchange on toxic chemicals;

(c) Establish technical cooperation with, and provide information to, other countries, especially those with shortages of technical expertise, including training in the interpretation of relevant technical data, such as Environmental Health Criteria Documents, Health and Safety Guides and International Chemical Safety Cards (published by IPCS); monographs on the Evaluation of Carcinogenic Risks of Chemicals to Humans (published by the International Agency for Research on Cancer (IARC)); and decision guidance documents (provided through the FAO/UNEP joint programme on PIC), as well as those submitted by industry and other sources;

(d) Implement the PIC procedures as soon as possible and, in the light of experience gained, invite relevant international organizations, such as UNEP, GATT, FAO, WHO and others, in their respective area of competence to consider working expeditiously towards the conclusion of legally binding instruments.

(b) Data and information

19.41. Governments and relevant international organizations with the cooperation of industry should:

(a) Assist in the creation of national chemical information systems in developing countries and improve access to existing international systems;

(b) Improve databases and information systems on toxic chemicals, such as emission inventory programmes, through provision of training in the use of those systems as well as software, hardware and other facilities;

(c) Provide knowledge and information on severely restricted or banned chemicals to importing countries to enable them to judge and take decisions on whether to import, and how to handle, those chemicals and establish joint responsibilities in trade of chemicals between importing and exporting countries;

(d) Provide data necessary to assess risks to human health and the environment of possible alternatives to banned or severely restricted chemicals.

19.42. United Nations organizations should provide, as far as possible, all international information material on toxic chemicals in all United Nations official languages.

(c) International and regional cooperation and coordination

19.43. Governments and relevant international organizations with the cooperation of industry should cooperate in establishing, strengthening and expanding, as appropriate, the network of designated national authorities for

exchange of information on chemicals and establish a technical exchange programme to produce a core of trained personnel within each participating country.

Means of implementation

Financing and cost evaluation*

[19.44. Annual international financing of about $10 million will be needed: $7 million for technical assistance and $3 million for strengthening international institutions.]

D. Establishment of risk reduction programmes

Basis for action

19.45. There are often alternatives to toxic chemicals currently in use. Thus, risk reduction can sometimes be achieved by using other chemicals or even non-chemical technologies. The classic example of risk reduction is the substitution of harmless or less harmful substances for harmful ones. Establishment of pollution prevention procedures and setting standards for chemicals in each environmental medium, including food and water, and in consumer goods, constitute another example of risk reduction. In a wider context, risk reduction involves broad-based approaches to reducing the risks of toxic chemicals, taking into account the entire life cycle of the chemicals. Such approaches could encompass both regulatory and non-regulatory measures, such as promotion of the use of cleaner products and technologies, pollution prevention procedures and programmes, emission inventories, product labelling, use limitations, economic incentives, procedures for safe handling and exposure regulations, and the phasing out or banning of chemicals that pose unreasonable and otherwise unmanageable risks to human health and the environment and of those that are toxic, persistent and bio-accumulative and whose use cannot be adequately controlled.

19.46. In the agricultural area, integrated pest management, including the use of biological control agents as alternatives to toxic pesticides, is one approach to risk reduction.

19.47. Other areas of risk reduction encompass the prevention of chemical accidents, prevention of poisoning by chemicals and the undertaking of toxicovigilance and coordination of clean-up and rehabilitation of areas damaged by toxic chemicals.

19.48. The OECD Council has decided that OECD member countries should establish or strengthen national risk reduction programmes. The International Council of Chemical Associations (ICCA) has introduced initiatives regarding responsible care and product stewardship aimed at reduction of chemical risks. The Awareness and Preparedness for Emergencies at Local Level (APELL) programme of UNEP is designed to assist decision makers and technical

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personnel in improving community awareness of hazardous installations and in preparing response plans. ILO has published a Code of Practice on the prevention of major industrial accidents and is preparing an international instrument on the prevention of industrial disasters for eventual adoption in 1993.

Objectives

19.49. The objective of the programme area is to eliminate unacceptable or unreasonable risks and, to the extent economically feasible, to reduce risks posed by toxic chemicals, by employing a broad-based approach involving a wide range of risk reduction options and by taking precautionary measures derived from a broad-based life-cycle analysis.

Activities

(a) Management-related activities

19.50. Governments, through the cooperation of relevant international organizations and industry, where appropriate, should:

(a) Consider adopting policies based on accepted producer liability principles, where appropriate, as well as precautionary, anticipatory and life-cycle approaches to chemical management, covering manufacturing, trade, transport, use and disposal;

(b) Undertake concerted activities to reduce risks for toxic chemicals, taking into account the entire life cycle of the chemicals. These activities could encompass both regulatory and non-regulatory measures, such as promotion of the use of cleaner products and technologies; emission inventories; product labelling; use limitations; economic incentives; and the phasing out or banning of toxic chemicals that pose an unreasonable and otherwise unmanageable risk to the environment or human health and those that are toxic, persistent and bio-accumulative and whose use cannot be adequately controlled;

(c) Adopt policies and regulatory and non-regulatory measures to identify, and minimise exposure to, toxic chemicals by replacing them with less toxic substitutes and ultimately phasing out the chemicals that pose unreasonable and otherwise unmanageable risk to human health and the environment and those that are toxic, persistent and bio-accumulative and whose use cannot be adequately controlled;

(d) Increase efforts to identify national needs for standard setting and implementation in the context of the FAO/WHO Codex Alimentarius in order to minimise adverse effects of chemicals in food;

(e) Develop national policies and adopt the necessary regulatory framework for prevention of accidents, preparedness and response, inter alia, through land-use planning, permit systems and reporting requirements on accidents, and work with the OECD/UNEP international directory of regional response centres and the APELL programme;

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(f) Promote establishment and strengthening, as appropriate, of national oison control centres to ensure prompt and adequate diagnosis and treatment f poisonings;

(g) Reduce overdependence on the use of agricultural chemicals through lternative farming practices, integrated pest management and other ppropriate means;

(h) Require manufacturers, importers and others handling toxic chemicals o develop, with the cooperation of producers of such chemicals, where pplicable, emergency response procedures and preparation of on-site and ff-site emergency response plans;

(i) Identify, assess, reduce and minimize, or eliminate as far as easible by environmentally sound disposal practices, risks from storage of utdated chemicals.

19.51. Industry should be encouraged to:

(a) Develop an internationally agreed upon code of principles for the anagement of trade in chemicals, recognizing in particular the responsibility for making available information on potential risks and environmentally sound disposal practices if those chemicals become wastes, in cooperation with Governments and relevant international organizations and appropriate agencies of the United Nations system;

(b) Develop application of a "responsible care" approach by producers and manufacturers towards chemical products, taking into account the total life cycle of such products;

(c) Adopt, on a voluntary basis, community right-to-know programmes based on international guidelines, including sharing of information on causes of accidental and potential releases and means of preventing them, and reporting on annual routine emissions of toxic chemicals to the environment in the absence of host country requirements.

(b) Data and information

19.52. Governments, through the cooperation of relevant international rganizations and industry, where appropriate, should:

(a) Promote exchange of information on national and regional activities to reduce the risks of toxic chemicals;

(b) Cooperate in the development of communication guidelines on chemical risks at the national level to promote information exchange with the public and the understanding of risks.

International and regional cooperation and coordination

53. Governments, through the cooperation of relevant international organizations and industry, where appropriate should:

(a) Collaborate to develop common criteria to determine which chemicals are suitable candidates for concerted risk reduction activities;

(b) Coordinate concerted risk reduction activities;

(c) Develop guidelines and policies for trade disclosure by manufacturers, exporters and others using toxic chemicals of toxicity information declaring risks and emergency response arrangements;

(d) Encourage large industrial enterprises including transnational corporations and other enterprises wherever they operate to introduce policies demonstrating the commitment, with reference to the environmentally sound management of toxic chemicals, to adopt standards of operation equivalent to or not less stringent than those existing in the country of origin;

(e) Encourage and support the development and adoption by small- and medium-sized industries of relevant procedures for risk reduction in their activities;

(f) Develop regulatory and non-regulatory measures and procedures aimed at preventing the export of chemicals that are banned, severely restricted, withdrawn or not approved for health or environmental reasons, except when such export has received prior written consent from the importing country or is otherwise in accordance with the PIC procedure;

(g) Encourage national and regional work to harmonize evaluation of pesticides;

(h) Promote and develop mechanisms for the safe production, management and use of dangerous materials, formulating programmes to substitute for them safer alternatives, where appropriate;

(i) Formalize networks of emergency response centres;

(j) Encourage industry, with the help of multilateral cooperation, to phase out as appropriate, and dispose of, any banned chemicals that are still in stock or in use in an environmentally sound manner, including safe reuse, where approved and appropriate.

Means of implementation

(a) Financial and cost evaluation*

[19.54 Risk assessment is a prerequisite for many actions needed to meet the objectives of this programme area. These costs are included in estimates for

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gramme areas A and B and part of the costs of national-level programmes are luded under programme area E. About $4 million will be needed annually m the international community for training and strengthening the emergency poison control centres.]

Scientific and technological means

55. Governments, in cooperation with relevant international organizations l programmes, should:

(a) Promote technology that would minimize release of, and exposure to, ic chemicals in all countries;

(b) Carry out periodical reviews, as appropriate, of previously accepted ticides whose acceptance was based on criteria now recognized as ufficient or outdated and of their possible replacement with other pest trol methods, particularly in the case of pesticides that are toxic, sistent and/or bio-accumulative.

E. Strengthening of national capabilities and capacities for management of chemicals

sis for action

.56. Many countries lack national systems to cope with chemical risks. st countries lack scientific means of collecting evidence of misuse and of dging the impact of toxic chemicals on the environment, because of the fficulties involved in the detection of many problematic chemicals and stematically tracking their flow. Significant new uses are among the tential hazards to human health and the environment in developing untries. In several countries with systems in place there is an urgent need make those systems more efficient.

.57. Basic elements for sound management of chemicals are: (a) adequate gislation, (b) information gathering and dissemination, (c) capacity for isk assessment and interpretation, (d) establishment of risk management olicy, (e) capacity for implementation and enforcement, (f) capacity for habilitation of contaminated sites and poisoned persons, (g) effective ducation programmes and (h) capacity to respond to emergencies.

.58. As management of chemicals takes place within a number of sectors lated to various national ministries, experience suggests that a ordinating mechanism is essential.

bjective

.59. By the year 2000, national systems for environmentally sound anagement of chemicals, including legislation and provisions for plementation and enforcement, should be in place in all countries to the tent possible.

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Activities

(a) Management-related activities

19.60. Governments, where appropriate and with the collaboration of relevant intergovernmental organizations, agencies and programmes of the United Nations system, should:

(a) Promote and support multidisciplinary approaches to chemical safety problems;

(b) Consider the need to establish and strengthen, where appropriate, a national coordinating mechanism to provide a liaison for all parties involved in chemical safety activities (for example, agriculture, environment, education, industry, labour, health, transportation, police, civil defence, economic affairs, research institutions, and poison control centres);

(c) Develop institutional mechanisms for the management of chemicals, including effective means of enforcement;

(d) Establish and develop or strengthen, where appropriate, networks of emergency response centres, including poison control centres;

(e) Develop national and local capabilities to prepare for and respond to accidents by taking into account the UNEP APELL programme and similar programmes on accident prevention, preparedness and response, where appropriate, including regularly tested and updated emergency plans;

(f) Develop, in cooperation with industry, emergency response procedures, identifying means and equipment in industries and plants necessary to reduce impacts of accidents.

(b) Data and information

19.61. Governments should:

(a) Direct information campaigns such as programmes providing information about chemical stockpiles, environmentally safer alternatives and emission inventories that could also be a tool for risk reduction to the general public to increase the awareness of problems of chemical safety;

(b) Establish, in conjunction with IRPTC, national registers and databases, including safety information, for chemicals;

(c) Generate field monitoring data for toxic chemicals of high environmental importance;

(d) Cooperate with international organizations, where appropriate, to effectively monitor and control the generation, manufacturing, distribution, transportation and disposal activities relating to toxic chemicals, to foster

eventive and precautionary approaches and ensure compliance with safety nagement rules, and provide accurate reporting of relevant data.

) International and regional cooperation and coordination

.62. Governments, with the cooperation of international organizations, ere appropriate, should:

(a) Prepare guidelines, where not already available, with advice and eck-lists for enacting legislation in the chemical safety field;

(b) Support countries, particularly developing countries, in developing d further strengthening national legislation and its implementation;

(c) Consider adoption of community right-to-know or other public formation-dissemination programmes, when appropriate, as possible risk duction tools. Appropriate international organizations, in particular UNEP CD, the Economic Commission for Europe (ECE) and other interested parties, ould consider the possibility of developing a guidance document on the tablishment of such programmes for use by interested Governments. The cument should build on existing work on accidents and include new guidance toxic emission inventories and risk communication. Such guidance should clude harmonization of requirements, definitions and data elements to omote uniformity and allow sharing of data internationally;

(d) Build on past, present and future risk assessment work at an ternational level, to support countries, particularly developing countries, developing and strengthening risk assessment capabilities at national and gional levels to minimize risk in the manufacturing and use of toxic emicals;

(e) Promote implementation of UNEP's APELL programme and, in particular e of an OECD/UNEP international directory of emergency response centres;

(f) Cooperate with all countries, particularly developing countries, in e setting up of an institutional mechanism at the national level and the velopment of appropriate tools for management of chemicals;

(g) Arrange information courses at all levels of production and use, med at staff working on chemical safety issues;

(h) Develop mechanisms to make maximum use in countries of ternationally available information;

(i) Invite UNEP to promote principles for accident prevention, reparedness and response for Governments, industry and the public, building a ILO, OECD and ECE work in this area.

Means of implementation

(a) Financing and cost evaluation*

[19.63. National annual costs for regulatory efforts, including enforcement, have been estimated as a proportion of the value of chemicals manufactured or imported. On this basis the annual requirements in developing countries would amount to $500 million-$600 million. It is suggested that $100 million-$150 million be provided as concessional finance for this purpose to developing countries by the international community.]

(b) Scientific and technological means

19.64. International organizations should:

(a) Promote the establishment and strengthening of national laboratories to ensure the availability of adequate national control in all countries regarding the importation, manufacture and use of chemicals;

(b) Promote translation where feasible of internationally prepared documents on chemical safety into local languages and support various levels of regional activities related to technology [transfer] and information exchange.

(c) Human resource development

19.65. International organizations should:

(a) Enhance technical training for developing countries in relation to risk management of chemicals;

(b) Promote and increase support for research activities at the local level by providing grants and fellowships for studies at recognized research institutions active in disciplines of importance for chemical safety programmes.

19.66. Governments should organize, in collaboration with industry and trade unions, training programmes in the management of chemicals, including emergency response, targeted at all levels. In all countries basic elements of chemical safety principles should be included in the primary education curricula.

F. Prevention of illegal international traffic in toxic and dangerous products

19.67. There is currently no global international agreement on traffic in toxic and dangerous products (toxic and dangerous products are those that are banned, severely restricted, withdrawn or not approved for use or sale by Governments in order to protect public health and the environment). However, there is international concern that illegal international traffic in these products is detrimental to public health and the environment, particularly in developing countries, as acknowledged by the General Assembly in resolutions 42/183 and 44/226. Illegal traffic refers to traffic that is carried out in contravention of a country's laws or relevant international legal instruments. The concern also relates to transboundary movements of those products that are not carried out in accordance with applicable internationally adopted guidelines and principles. Activities under this programme area are intended to improve detection and prevention of the traffic concerned.

19.68. Further strengthening of international and regional cooperation is needed to prevent illegal transboundary movement of toxic and dangerous products. Furthermore, capacity-building at the national level is needed to improve monitoring and enforcement capabilities involving recognition of the fact that appropriate penalties may need to be imposed under an effective enforcement programme. Other activities envisaged in the present chapter (for example, under paragraph 19.40 (d)) will also contribute to achieving these objectives.

Objectives

19.69. The objectives of the programme are:

(a) To reinforce national capacities to detect and halt any illegal attempt to introduce toxic and dangerous products into the territory of any State, in contravention of national legislation and relevant international legal instruments;

(b) To assist all countries, particularly developing countries, in obtaining all appropriate information concerning illegal traffic in toxic and dangerous products.

Activities

(a) Management-related activities

19.70. Governments, according to their capacities and available resources and with the cooperation of the United Nations and other relevant organizations, as appropriate, should:

(a) Adopt, where necessary, and implement legislation to prevent the illegal import and export of toxic and dangerous products;

(b) Develop appropriate national enforcement programmes to monitor compliance with such legislation, and detect and deter violations through appropriate penalties.

(b) Data and information

19.71. Governments should develop, as appropriate, national alert systems to assist in detecting illegal traffic in toxic and dangerous products; local communities, and others could be involved in the operation of such a system.

19.72. Governments should cooperate in the exchange of information on illegal transboundary movements of toxic and dangerous products and should make such information available to appropriate United Nations bodies, such as UNEP and the regional commissions.

(c) International and regional cooperation and coordination

19.73. Further strengthening of international and regional cooperation is needed to prevent illegal transboundary movement of toxic and dangerous products.

19.74. The regional commissions, in cooperation with and relying upon expert support and advice from UNEP and other relevant bodies of the United Nations, should monitor, on the basis of data and information provided by Governments, and on a continuous basis make regional assessments of, the illegal traffic in toxic and dangerous products and its environmental, economic and health implications, in each region, drawing upon the results and experience gained in the joint UNEP/ESCAP preliminary assessment of illegal traffic, expected to be completed in August 1992.

19.75. Governments and international organizations, as appropriate, should cooperate with developing countries in strengthening their institutional and regulatory capacities in order to prevent illegal import and export of toxic and dangerous products.

G. Enhancement of international cooperation relating to several of the programme areas

19.76. A meeting of government-designated experts, held in London in December 1991, made recommendations for increased coordination among United Nations bodies and other international organizations involved in chemical risk assessment and management. That meeting called for the taking of appropriate measures to enhance the role of IPCS and establish an intergovernmental forum on chemical risk assessment and management.

19.77. To further consider the recommendations of the London meeting and initiate action on them, as appropriate, the Executive Heads of WHO, ILO and UNEP are invited to convene an intergovernmental meeting within one year, which could constitute the first meeting of the intergovernmental forum.

ANNEX E. SAMPLE PESTICIDE LABELS

Annex E.1 Sample Label of A Mozambican Registered Insecticide (fenvalerate) Printed in Portuguese Language.

Annex E.2 Sample Labels of 2 Botanical Insecticides Registered in the U.S.

Annex E.1 Sample Label of A Mozambican Registered Insecticide (fenvalerate) Printed in Portuguese Language

SUMICIDIN 3%UBV

1. PRECAUÇÕES DE SEGURANÇA (CLASSE II):

ATENÇÃO O SUMICIDIN é venenoso quando respirado ou engolido e pode envenenar através da pele, irrita os olhos

a) Manusear com cuidado Evitar qualquer contacto do produto com a pele
b) Evitar respirar as gotas pulverizadas Não aplicar contra o vento nem com o vento forte
c) Tire e lave a roupa, luvas, etc , no fim do trabalho-nunca leve para casa
d) Não fumar, beber nem comer durante e depois das aplicações antes de lavar bem as mãos e a cara c/água c sabão
e) Use roupa que tape todo o corpo, luvas de borracha, botas de borracha, chapeu e máscara própria com filtro novo durante o manuseamento do produto e aplicação
f) PERIGOSO PARA ABELHAS E PEIXES
g) Não envenenar a água com restos do produto Lave o equipamento longe das fontes de água

2. SINTOMAS DE ALARME:

CASO SE SINTA MAL (dores de cabeça, enjoo, fraqueza, tremores) PARE IMEDIATAMENTE O TRABALHO, lave-se bem e mude de roupa, recorra o mais depressa possivel à unidade sanitária mais próxima

3. PRIMEIROS SOCORROS:

a) SE O PRODUTO CONTACTAR A PELE, lave-se imediatamente com muita água e sabão
b) SE O PRODUTO ATINJIR OS OLHOS, lave-os imediatamente com bastante água durante 10 minutos
c) SE O PRODUTO FOR ENGOLIDO, não tome medicamento, nem beba nada Recorra à unidade sanitária mais próxima levando consigo este rótulo

4. TRATAMENTO MÉDICO:

a) Não há antidoto especifico para FENVALERATO, Portanto Tratamento sintomático
b) Se o doente não tiver vomitado pode estar indicada a lavagem gástrica na 1ª hora O uso do carvao activo esta indicado (antidoto universal), assim como o diazepan ou o amoborbital para controlar os sintomas
c) São contra indicados todos os estimulantes do sistema nervoso central. IMPORTANTE Consultar a literatur disponivel na unidade sanitária sobre Piretrinas e Piretroides

REGISTO NO MINISTERIO DA AGRICULTURA (S-N-S-V) INIA SOB O NO IN 2/30 UBV-A
DIPLOMA MINISTERIAL No 88/87 de 29/07/1987

AGENTE EM MOÇAMBIQUE:

CIBA-GEIGY Trading and Marketing Services Co, Ltd.
P.O. Box 1114
Maputo, Mozambique

SUBSTÂNCIA ACTIVA (P/V)

FENVALERAT

INSECTICIDA

PERI

VENE

MANTER AFASTADO DAS CRIANÇAS

Nº do lote
Data de Fabrico
Prazo de validade 2 anos

FABRICANTE:

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SUMICIDIN® 3%UBV

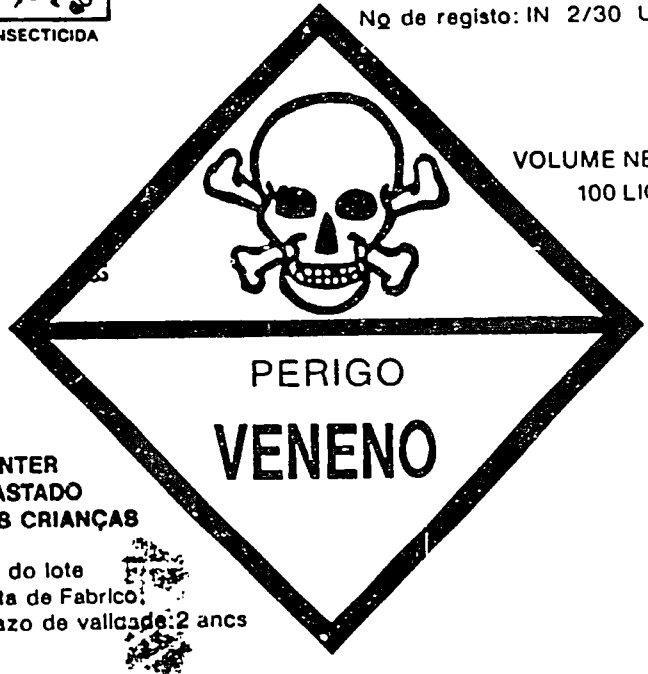
SUBSTÂNCIA ACTIVA (P/V):

FENVALERATO 3%UBV

INSECTICIDA

INSECTICIDA PIRETROIDE
PARA O ALGODÃO
ULTRA-BAIXO VOLUME (UBV)

Nº de registo: IN 2/30 UBV-A



VOLUME NETO:
100 LIQUIDO:

ANTER
ASTADO
AS CRIANÇAS

Q do lote
ata de Fabrico:
azo de validade: 2 ancs

SUMICIDIN® 3%UBV

INSTRUÇÕES DE USO

Antes de usar, leia as precaucoes de seguranca

Não misturar com água. Somente para Aplicacao via aérea ou num pulverizador de ultra-baixo volume ("ULVA")

CULTURA	PRAGA	DOSE (L/ha)	OBSERVACOES
	NUNCA EXCEDER A DOSE RECOMENDADA		
ALGODAÔ	Heliothis armigera (LAGARTA AMERICANA)	20–27	2 a 4 aplicações dependente da infestação Não controla jassides
	Diparopsis castanea (LAGARTA VERMELHA)		
	Earia insulana (LAGARTA ESPINHOSA)		
	Pectinophora gossypiella (LAGARTA ROSADA)	27–40	INTERVALO DE SEGURANÇA
	Aphis gossypii (AFIDEOS)		
	Zonocerus elegans (GAFANHOTO ELEGANTE)		
	LAGARTA DAS FOLHAS Cosmophila spp Plusia spp Spodoptera littoralis Dysdercus spp(MANCHANDOR DE FIBRAS)	40–60	14 dias entre a ultima aplicação e a colheita

ARMAZENAGEM ELIMINAÇÃO

Guardar todos os pesticidas separados de outros produtos, num armazem fresco, fechado a chave

FURAR ESTE TAMBOR quando estiver vazio
Enterrar em seguida.
NUNCA O USE PARA GUARDAR AGUA OU ALIMENTOS

PRODUTO INFLAMAVE

FABRICANTE:

SUMITOMO CHEMICAL CO., LDA
5-33, 4-CHOME, KITAHAMA,
CHUO-KU OSAKA, JAPÃO

AGENTE EM MOÇAMBIQUE:

CIBA-GEIGY Trading and Marketing Services Co. Ltd
P.O Box 1114
Maputo, Mozambique

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Annex E.2 Sample Labels of Botanica Insecticides Registered in the U.S.

Align™

Emulsifiable Concentrate

SPECIMEN LABEL

For control of insect pests in vegetable, fruit, nut and agronomic crops

ACTIVE INGREDIENTS:
Azadirachtin* 3.0%
INERT INGREDIENTS:.....97.0%
*Contains 0.265 pounds (120 grams) of azadirachtin per gallon

EPA Reg. No. 62552-1
EPA Est. No. 39578-TX-1

WARNING
KEEP OUT OF REACH OF CHILDREN

AVISO-PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

STATEMENT OF PRACTICAL TREATMENT

If in eyes: Flush eyes with plenty of water for 15 minutes. Call a physician if irritation persists

If inhaled: Move to fresh air. Clear lungs and airways Get medical attention if irritation develops.

If on skin: Wash with plenty of soap and water. Get medical attention if irritation develops.

If swallowed: Do not induce vomiting. Contact a physician immediately.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS: Harmful if swallowed or inhaled. Avoid breathing vapors or spray mist. Causes eye irritation. Do not get in eyes. Wash hands thoroughly after handling. Allow spray to dry before reentering treated areas.

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AGRIDYNE

ENVIRONMENTAL HAZARDS: This pesticide is toxic to fish and aquatic invertebrates Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate.

STORAGE AND DISPOSAL

GENERAL: Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited Do not reuse container.

STORAGE: Do not store above 100° F or below -20° F for extended periods of time. Keep containers tightly closed when not in use.

PESTICIDE DISPOSAL: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your state Pesticide or Environmental Control Agency, or Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: Do not reuse as a container Triple rinse or equivalent Then offer for recycling or reconditioning, or puncture and dispose of in an incinerator or landfill or by other procedures approved by state and local authorities.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

PESTS CONTROLLED BY ALIGN™

Armyworms
Beet Armyworm
Fall Armyworm
Southern Armyworm
Yellow-Striped Armyworm

Beetles
Colorado Potato Beetle

Borers
Peach Twig Borer

Caterpillars and Loopers
Cabbage Looper
Diamondback Moth
Fruit Tree Leafroller
Grape Leafroller
Imported Cabbageworm
Navel Orangeworm
Omnivorous Leafroller
Tobacco Budworm
Grapeleaf Skeletonizer

Cutworms
Black Cutworm
Citrus Cutworm
Variegated Cutworm

Flies
Mushroom Fly

Leafhoppers
Grape Leafhopper
Variegated Grape Leafhopper

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[illegible]

rb Vegetables
on
assica (cole)
getables
k choy
ocoli
ussels sprouts
bbage
uliflower
lery
inese cabbage
inese spinach
ard
dive
ohlrabi
ttuce
ustard green
inach
iss chard

itrus Fruits
itrus citron
rapefruit
emon
me
andarin
angerine)
range, sour
range, sweet

Cucurbit Vegetables
antaloupe
renshaw
ucumber
honeydew
pumpkin
squash
watermelon

Fruiting Vegetables
eggplant
pepper
tomato

Herbs and Spices
anise
balm
basil
borage
burnet
chamomile
caraway
catnip
chives
coriander
costmary
cumin
curry leaf
dandelion
dill
fennel
fenugreek
horshound
hyssop
mint
mangold
marjoram
nasturtium
pennyroyal
rosemary
rue
sage
savory
sweetbay
tansy
tarragon
thyme
wintergreen
woodruff
wormwood

Leguminous Vegetables
beans *(Phaseolus, Lupinus, Vicia, Vigna sp.)*
peas *(Pisum sp.)*

Nuts
almond
cashew
macadamia
pecan
pistachio
walnut

Pome Fruits
apple
crabapple
pear

Root and Tuber Vegetables
artichoke
beet, red
beet, sugar
carrot
parsnip
potato
radish
sweet potato
turnip
yam

Small Fruits and Berries
blackberry
blueberry
boysenberry
cranberry
currant
grapes
olives
raspberry
strawberry

Stone Fruits
apricot
cherry, sour
cherry, sweet
nectarine
peach
plum
prune

Miscellaneous Crops
asparagus
avocado
banana
coffee
figs
kiwi
mango
mushroom
papaya
persimmon
pineapple
plaintain
sorghum
tobacco
watercress

APPLICATION DIRECTIONS

Read all directions before using.

- Dilute ALIGN™ in water at the rate of 11-21 fluid ounces (10-20 grams active ingredient) per acre. Apply using any suitable ground or aerial equipment, in a manner to obtain uniform and complete plant coverage. Avoid overspraying to the point of excessive runoff.

- Applications should be made when pests first appear and are in their early larval stages. Repeat applications every 7 days or as needed.

- For best results, a non-ionic wetting agent should be added at the recommended label rate

- Dilute solutions containing ALIGN should be maintained at a pH between 4 and 7, and applied soon after preparation. Do not store for later use

- This product may be pre-mixed in a supply tank with water, fertilizer or other appropriate agricultural chemicals. Agitation is necessary (see mixing directions). Crop injury or lack of effectiveness can result if uniform distribution is not achieved

- When pest populations are high, use the higher ALIGN label rates

SPRAY

- High volume: When plant foliage is dense, use the higher label rates and increase spray gallonage to obtain uniform and complete coverage.

- Low volume: Apply ALIGN in a carrier appropriate for the application equipment. For best results, insure uniform and complete plant coverage.

- Aerial Application: ALIGN may be aerially applied using suitable equipment such as fixed wing aircraft or helicopters. Select appropriate carrier and equipment to provide uniform and complete coverage.

Align™ Application Rates for Key Insects/Pests

Pest	Rate per Acre	Remarks
Armyworm Cabbage Looper Colorado Potato Beetle Diamondback Moth Imported Cabbageworm Western Grapeleaf Skeletonizer	11 to 21 oz.	Foliar application/gallonage appropriate to ensure good coverage
Cutworm Fruit Tree Leafroller Navel Orangeworm Omnivorous Leafroller Peach Twig Borer	16 to 21 oz.	Foliar application/gallonage appropriate to ensure good coverage.
Leafhopper	21 oz.	Foliar application to nymphs. Use equipment to target the undersides of leaves.
Mushroom Fly	21 oz.	

Important Note: ALIGN has been evaluated for phytotoxicity on a wide range of crops. However, since all combinations or sequences of pesticide sprays including fertilizers, surfactants and adjuvants have not been tested, it is recommended that a small area be sprayed first to make certain that no phytotoxicity occurs.

- Reentry Preharvest Interval: This product can be applied up to and on the day of harvest. Workers may reenter the treated area without protective clothing as soon as the spray has dried.

CHEMIGATION

Refer to supplemental labeling entitled "AgriDyne's Chemigation Bulletin" for use directions for chemigation. Do not apply this product through any irrigation system unless the supplemental labeling on chemigation is followed.

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MODE OF ACTION

This product controls targeted insect larvae when they ingest or come in contact with it by interfering with the insect's ability to molt. It is effective on all larval stages and pupae.

DIRECTIONS FOR USE

ALIGN WITH WATER:
For best results.

1. Use clean equipment.
2. Fill tank 1/2 full to 3/4 full with water and begin agitation.
3. Add pesticide to the tank.
4. Fill the tank completely with water and mix thoroughly before applying.
5. Adjust spray solution to between 4 and 7 pH, if necessary.
6. Pesticide mix should be applied immediately after mixing.
7. If the mixture is not applied immediately, agitate before application.
8. Thoroughly clean equipment following application.

TANK MIXTURES WITH ALIGN:

1. Before using this product in a tank mix with fertilizer or registered pesticide, determine compatibility by conducting a compatibility test with a small amount of each product.
2. Observe all cautions and limitations on the labels of all products used in combination.
3. Follow all tank mix directions and observe limitations listed in the combination products labels.

COMPATIBILITY TEST

A compatibility test should be performed before tank mixing this product with other products or liquid fertilizer(s). Fill three separate quart jars with 1 pint of water or fertilizer. To a first jar add this product and mix well. To a second jar, add the desired other tank mix product(s) and mix well. To a third jar, combine this product with the other tank mix product(s) and mix well. If more than one product is used, add them separately with dry formulations first, flowables next, and emulsifiable concentrates last. After each addition, shake or stir gently to thoroughly mix. For the appropriate amount of product for this test use the following:

DRY PRODUCTS- For each pound to be applied per acre, add 1.5 level teaspoons to each jar.

LIQUID PRODUCTS- For each pint to be applied per acre, add 0.5 teaspoons or 2.5 ml to each jar.

Note any differences between the mixtures in the jars (compounds alone vs. mixtures) after 15 minutes. Look for evidence of physical incompatibility such as clumping, precipitation, oily residues on the sides of the glass or other signs of incompatibility. If either mixture separates, but can be readily remixed, the mixture can be sprayed as long as good agitation is used. If the mixtures are incompatible, do not use the mixtures. For additional information or assistance call AgriDyne's at Customer Service at (800) 657-3090.

LIMITED WARRANTY AND LIABILITY

Read this Limited Warranty and Liability before buying or using this product. AgriDyne Technologies Inc. warrants that this product conforms to the chemical description on the label and, if used in accordance with directions for use, is fit for the purposes referred to. It is impossible, however, to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials or the manner of use or application, all of which are beyond the control of AgriDyne Technologies Inc. All such risks are expressly assumed by the buyer.

AgriDyne Technologies Inc. makes no other warranties, merchantability or fitness for a particular purpose nor any other express or implied warranty except as stated above. Under no circumstances shall the manufacturer be held liable for consequential or indirect damages resulting from the use or handling of this product. Damages caused by this product shall be limited to the purchase price.

If you have questions or comments regarding the use of ALIGN, please call (801) 583-3500 during business hours.

Manufactured By:

AGRIDYNE
TECHNOLOGIES INC

417 Wakara Way • Salt Lake City, Utah 84108
(801) 583-3500 or (800) 657-3090

SHAKE WELL

DOSING DIRECTIONS
Thoroughly mix each quart of Garlic Barrier to 10 ozs of water for one minute.

APPLICATION DIRECTIONS
TIMING: For Vegetables, spray several days before harvesting. DO NOT apply just prior to or during blossom as Garlic Barrier repels bees and, therefore, adversely affects pollination.
METHODS OF APPLICATION: Garlic Barrier may be applied with air or ground equipment.
RATE OF APPLICATION: Set equipment to apply diluted spray to the point of runoff, or about one gallon per acre.
MINIMUM NUMBER OF APPLICATIONS: Two Applications per season.
AFTER TASTE: Garlic Barrier will leave no "After Taste".

STORAGE AND DISPOSAL
Do not contaminate water, food, or feed by storage or disposal.
STORAGE: Store only in original container in a cool, dry place inaccessible to children and pets.
DISPOSAL: Do not reuse empty container. Rinse thoroughly, securely wrap in newspaper and discard in trash.

ACTIVE INGREDIENTS: 100% GARLIC WATER

GARLIC BARRIER

INSECT REPELLENT

Keeps insects from getting on plants and trees.

Applied product becomes odorless in minutes.

One diluted pint covers 1/8 Acre.

CAUTION: KEEP OUT OF REACH OF CHILDREN
Avoid contact with eyes. If in the Eyes flush with plenty of water

NET WEIGHT: 16 OZ

SHAKE WELL

DIRECTIONS FOR USE
It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

USE RESTRICTIONS:
Garlic Barrier is registered for the following Sites and Pests:

SITES: TERRESTRIAL FOOD CROPS:
FRUIT TREES-Apple, Apricot, Peach, Pear, Plum
NUT TREES-Almond, Walnut
CITRUS TREES-Lemon, Orange
VEGETABLES-Beans, Cabbage, Cantaloupe, Carrots, Corn, Lettuce, Melons, Onions, Peas, Potatoes, Pumpkins
VINE CROPS-Grapes, Kiwi

PESTS: Ants, Aphids, Grasshoppers, Leaf Loopers, Leafrollers, Spiders, Spider Mites, Thrips, Whiteflies

EPA Registration No.62998-1-AA-68352
EPA Est No.62998-CA-2

Distributed by:
Garlic Research Labs
3550 Wilshire Boulevard, #720
Los Angeles, California 90010

Made in USA

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ANNEX F. MOZAMBICAN INFORMATION RELATED TO NATURAL RESOURCES AND MONITORING

Annex F.1 Fauna in Mozambique and Globally Threatened and Endangered Wildlife Species Occurring There.

Annex F.2 Descriptive Folder on Laboratorio Nacional de Higiene de Agua e Alimentos (National Laboratory of Hygiene of Water and Food).

Annex F.3 Fax from Dr. Aswathanarayana of Eduardo Mondlane University, Maputo, plus Information on Possible Cooperative Project Between Universidade Eduardo Mondlane and Lamar University, Beaumont, Texas for Training Environmental Monitors for Mozambique.

Annex F.1 List of Protected Animals in Mozambique

Protected Fauna of Mozambique (partially translated from "Lista dos animais protegidos") (* = species on the verge of extinction)

1. Mamíferos (Mammals):

Cabrito das pedras (Stone kid)
Caracal (Karakul)
Chacal dorso preto (Black back jackal)
Chacal listrado (Stripped jackal)
Chango da montanha
* Chita (Cheetah)
Civeta (Civet cat)
* Dugongo
Doninha nuca branca
Gato bravo (Wild cat)
Gato cerval (cerval cat)
Genetas ou simbas
* Girafa (Giraffe)
Hiena catanha (Brown hyena)
Hiena malhada (Spotted hyena)
Jagras (Jaguar)
Lontras (Otters)
Mabeco (Wild dog)
Macaco de cara preta ou azul (Blue or Black face monkey)
Macaco Simango (Simango monkey)
Mangucos (Mongoose)
Maritacaca (skunk)
* Matagaiça
* M'zanze
Pangolim (Pangolin, a mammal)
Protelo
Raposa orelhuda (Big-ear fox)
Ratel
* Rincoceronte delábio preensil (Prehensile lip rhinoceros)
* Rinoceronte de lábio quadrado (Quadrate lip rhinoceros)
* Sitatunga
* Elefante (Elephants)

2. Aves (Birds):

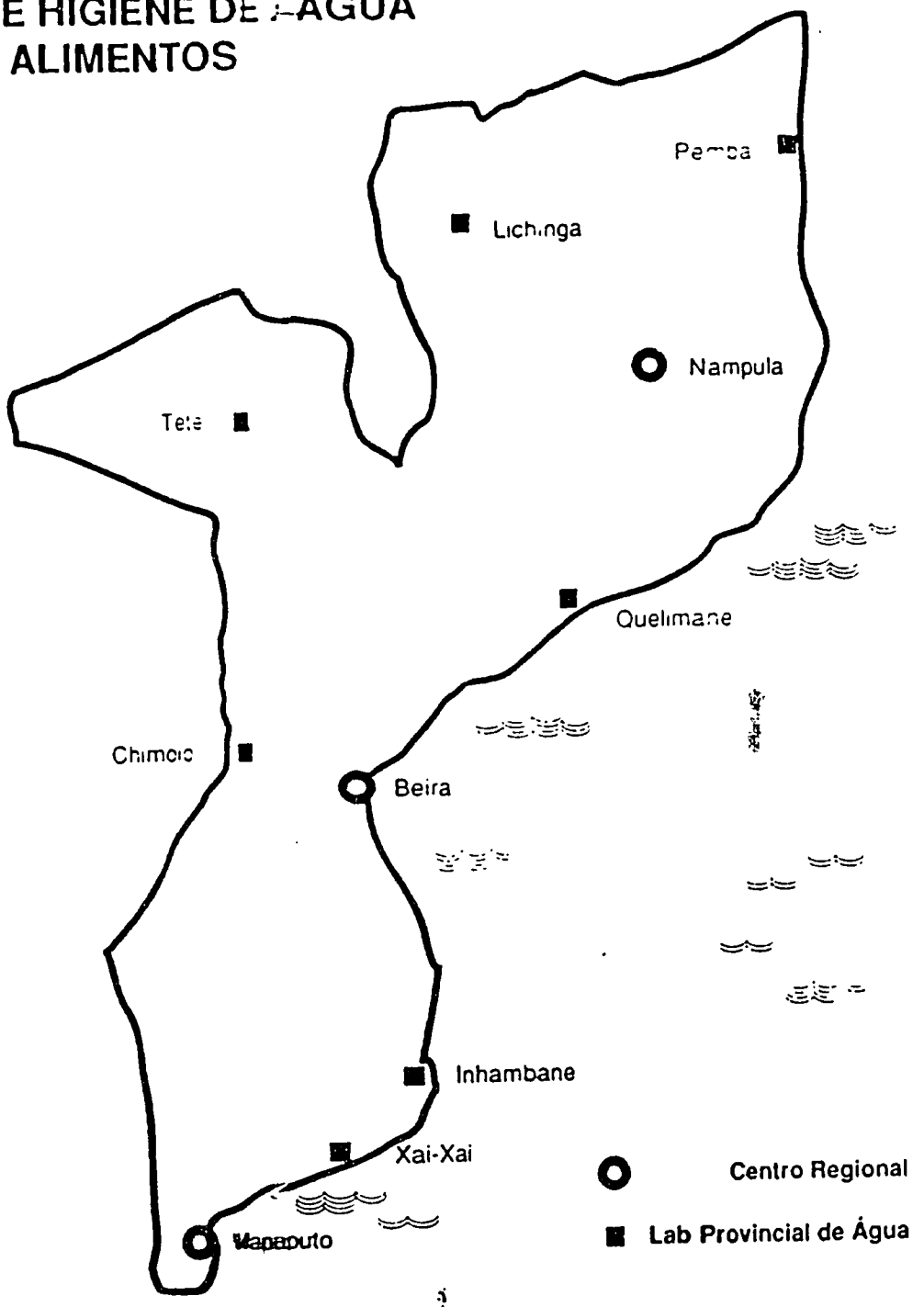
Rapina/diurnas e nocturnas) (Diurnal and nocturnal Robin)
Abetrada gigante (Giant Albatross)
Abutres (Vultures)
* Avestruz (Ostriches)
Calau do solo
Cegonhas
Flamingos (Flamingos)
Gaviotas e gaivanhas (Sea Gulls)
Graças
Marabu (Marabou)
Pelicanos (Pelicans)
Serpentário

3. Répteis (Reptiles):

Tartarugas marinhas (Sea turtles)
Lagartas varanaus (Lizard)
Pitão ou gibóia (Pythons)

Annex F.2 **Descriptive Folder on Laboratorio Nacional de Higiene de Agua e Alimentos (National Laboratory of Hygiene of Water and Food)**

LABORATÓRIO NACIONAL DE HIGIENE DE ÁGUA E ALIMENTOS



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LABORA
DE HIGIENE DE

Análise microbiológica

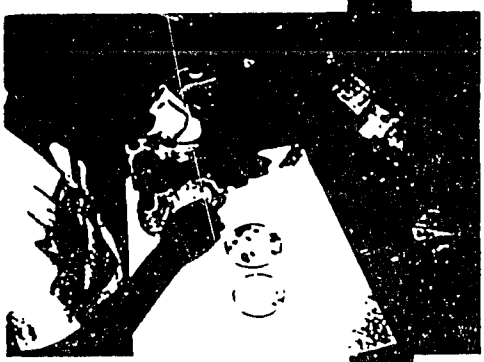
O Departamento de Alimentos está habilitado a apoiar as indústrias alimentares e outros estabelecimentos do ramo.

Este Departamento dispõe dos Laboratórios de:

- **Microbiologia**
- **Química**
  - Química Clássica
  - Espectrofotometria
  - Cromatografia (TLC, GC e HPLC)

Devido à sua capacidade analítica e à instrumentação disponível, o Laboratório tem já um vínculo forte com outras áreas de serviço e diagnóstico, disponibilizando-se para fazer análises toxicológicas em produtos biológicos (sangue, urina e outros), raízes e produtos desconhecidos.

- **Entomologia**

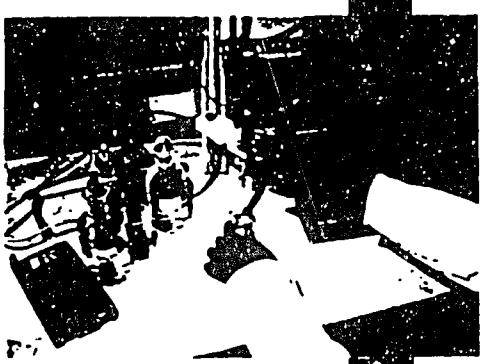


Qualidade dos cereais

O Departamento de Águas está capacitado para fazer o controlo químico e bacteriológico de diferentes tipos de água:

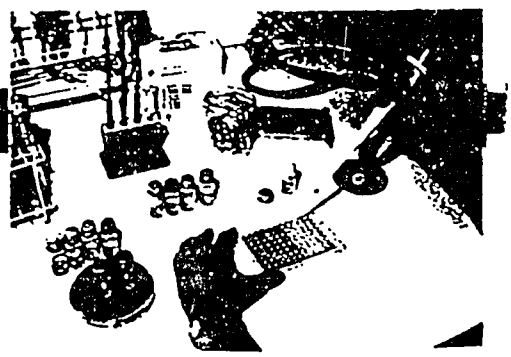
- águas para beber
- águas minerais
- águas de piscinas
- águas residuais,industriais e domésticas
- outras

As análises são feitas com a utilização de métodos da Química Clássica e Instrumental; na Bacteriologia usam-se métodos clássicos e por membrana filtrante.



Química da água

Microbiologia da água



Identificação de patogénios

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RIO NACIONAL
ÁGUA E ALIMENTOS

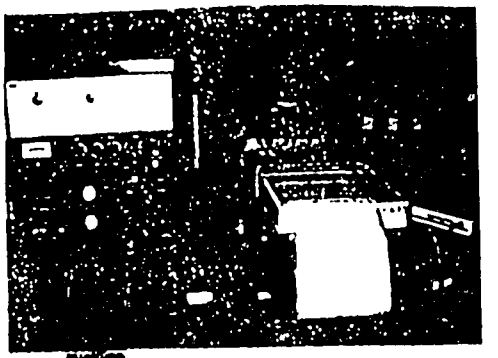
lista de analises

Bacteriologia

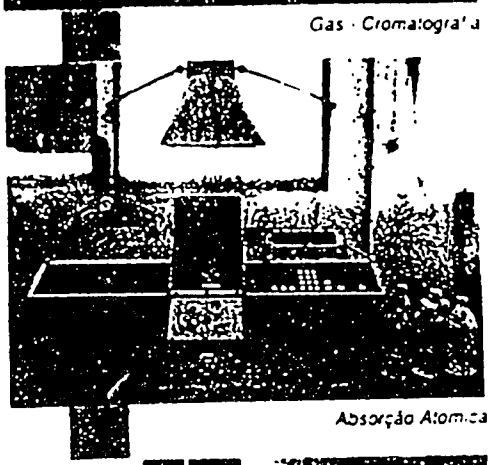
- contagem total de bacterias
- coliformes totais e fecais
- estreptococos fecais
- bolores e leveduras
- pesquisa, identificação e confirmação de bacterias patogenicas
- bacterias lipoliticas
- bacterias halofilicas
- bacterias lacticas
- bacterias anaerobicas
- bacterias sulfito redutoras

Química

- determinação da composição química dos vários tipos de alimentos.
  - humidade
  - azoto total
  - açucares
  - dioretos
  - metanol
  - celulose
  - fusel oil
  - cinzas
  - gordura
  - extracto seco
  - grau alcoolico
  - amido
  - acidez
  - polarização
- determinação qualitativa/quantitativa de:
  - elementos minerais
  - metais pesados
  - resíduos de pesticidas e aflatoxinas
  - adtivos alimentares
  - tóxicos naturais
  - tóxicos químicos
  - cosméticos, detergentes e sabões

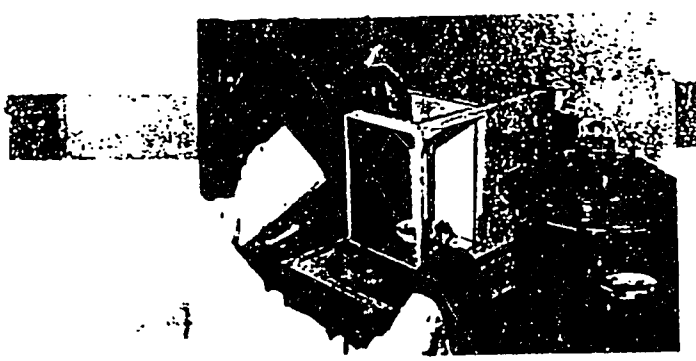


Gas - Cromatografia



Absorção Atomica

Espectrofotometria



Pesagens

Análise Bromatológica

Além das actividades de rotina fazemos:

Investigação

Formação

- cursos para pessoal do Ministério da Saúde
- cursos dirigidos à indústria alimentar
  - higiene de alimentos
  - higienização de piscinas
  - tratamento de água
- apoio a estabelecimentos educacionais

O **LNHAA** está envolvido em estudos da poluição ambiental.

LABORATÓRIO NACIONAL DE HIGIENE DE ÁGUA E ALIMENTOS, MINISTÉRIO DA SAÚDE
Av. Eduardo Mondlane, 4º andar, Telefones 27131 e ext 229 275 ou 425178, Caixa Postal 264
MAPUTO, MOÇAMBIQUE

Annex F.3 Fax from Dr. Aswathanarayana of Eduardo Mondlane University, Maputo, plus Information on Possible Cooperative Project Between Universidade Eduardo Mondlane and Lamar University, Beaumont, Texas for Training Environmental Monitors for Mozambique.

UNIVERSIDADE EDUARDO MONDLANE

Faculdade de Ciencias

From Dr Isidro Manuel , Ph D Geology ,
Deputy Dean for Research and Development,
Eduardo Mondlane University
C P 257 , Maputo , Mozambique
(Fax . 258-1- 491557)

Maputo , Aug 16 , 1993

Professor A.V. Murali , Department of Geology ,
Lamar University ,Beaumont , TX 77710 , USA
(Fax : + 1- 409-880 8007)

Dear Professor Murali ,

Re : Cooperative project on " Formulation of environmental monitoring systems for a low-income Developing country - A pilot project for Mozambique " .

This has reference to your fax of Aug 10 ,93 to Professor U. Aswathanarayana containing the draft project proposal . On behalf of the Faculty of Science , I have the honour of thanking you most sincerely for the cooperation extended by your institution to help us to train the Mozambican personnel and establish in due course the necessary analytical facilities in Maputo . The eight Mozambicans that are proposed to be trained under the project can be drawn from the Faculty of Science (Departments of Geology, Chemistry and Biology) , and Faculty of Agronomy , and if available , from the National Environment Commission. At the end of the project , the personnel trained and the facilities established in Maputo , can constitute a National Facility for continuous monitoring of the environment in the country. We can state , right at the outset , that the proposed Facility could serve the countries in the Southern AFrican Development Cooperation (SADC) entity after it becomes fully functional .

While the projected plan of work , time frame and budget are acceptable to us in principle , I strongly suggest that for field work in Mozambique , we need a 4WD vehicle (costing about USD 30,000) . The expenses for fuel and maintenance for one year are estimated to be USD 5000 or USD 15 000 for the three years of the project . Prof. Aswathanarayana agrees with this estimate .

We are processing the cooperative project proposal as per our procedures. We are consulting the Faculty of Science , the relevant University authorities, the National Environment Commission , and the Ministry of Cooperation through whom the project will be finally presented to the donor agencies . We will keep you informed of the progress .

Yours sincerely ,
Isidro Rafael V. Manuel

Praça 25 de Junho C.P. 257 - Maputo República de Moçambique

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Telefax Sept. 8 , 1993

From : Professor U. Aswathanarayana , Maputo
Fax : 420964

To : Mr. Scott Hudson , U S.A.I.D. Mission , Maputo
Fax : 492098

Dear Mr. Hudson ,

Further to our telephonic conversation today , I am submitting herewith a copy of the Executive Summary of the project , for your kind perusal and comments . Kindly send a copy of the Executive Summary to Mr. Fisher. You may kindly inform him that I have already met Mr. Fransisco Mabjaia of the National Environment Commission , as also Mr Bernardo Feraz , Director General of he Commission . Their response has been positive . Most likely, Mr. Mabjaia may himself be able to participate in the project.

We plan to have a meeting of the concerned national agencies around Sept. 20 to finalise the draft project document , and to decide upon the modalities of seeking donor assistance . After this exercise , we will discuss the draft document informally with your Mission , pending its formal submission according to prescribed procedures I have informed Professor Murali of Lamar University , that the project document (signed by UEM and Lamar) has to be presented by the National Executive Agency to US AID Mission in Maputo which would then process and decide upon it in consultation with other donor agencies .

Any information / ideas that you may kindly be pleased to provide to improve the acceptability of the project would be most welcome .

With kind regards ,

Yours sincerely ,

U. Aswathanarayana

Professor U. Aswathanarayana

cc : Mr. Fransisco Mabjaia , NEC , Maputo (fax : 465849) , for kind information . A copy of the fax of Mr. Fisher and the Executive Summary are enclosed .

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Cooperative Project between Universidade Eduardo Mondlane, Maputo, Mozambique, and Lamar University, Beaumont, Texas, USA.

Title of the Project : Formulation of Environmental Monitoring systems towards sustainable development of a low-income Developing country : A pilot project for Mozambique .

Executive Summary

Mozambique has the lowest income in the world (GNP of USD 80), with agriculture accounting for 65 % of GNP . Excessive use of soil, water, and biota due to population pressure (ex : Beira Corridor), deforestation for fuel wood , and improper agricultural practices , have led to disastrous loss of soil fertility , resulting in low crop yields (ex. : 0.5 t / ha for maize) and low nutrient content of crops and vegetables in the country. The general malnutrition (low daily calorie supply of 1680), and poor health situations (low life expectancy of 47 yrs. ; high infant mortality of 137 for 1000 live births) compared with other low-income Developing countries (World Development Report, 1992 , of the World Bank) reflect the poor land husbandry practices and lack of environmental monitoring systems in the country .

Development of policies and programmes to address the problems of degradation of soil , water , air and biota in Mozambique , requires (a) a data base to model the nutrient / toxic elemental sources , pathways / concentrations , and (b) an infrastructure of environmental monitoring facilities in the country . In order to formulate the environmental monitoring systems aimed at ecologically and economically sustainable development of the natural resources of the country , and to build the institutional capacity of Universidade Eduardo Mondlane (UEM) , Maputo , to enable them to carry out the environmental monitoring and data evaluation programs in the country, we propose a collaborative project between UEM , Maputo , Mozambique , and Lamar University , Beaumont , U.S.A. The proposed project will be addressed to the following three major tasks :

1. Analysis of nutrient elements (K ,Ca ,P, Mg , Fe, Zn, Mn, F , Cu, Mo, Cr, Se and I) , toxic heavy elements (Pb , Cd , Hg , As , etc.) an[redacted] and the anthropological pollutants, in soils , waters and foodstuffs (cereals and seafood) in a large number of samples (about a thousand) collected from different regions in Mozambique , at Lamar University laboratories ; this database will be used to model the dynamics of the environmental processes in terms of sources , pathways and residence times of the elements and compounds for the purpose of formulating appropriate environmental monitoring systems (techniques and software) relevant to the problems of Mozambique ,

2. Train personnel from UEM at Lamar University laboratories in all aspects of the field and laboratory studies of production , reduction and interpretation of data , and modelling procedures ; the personnel thus trained will form the nucleus of an environmental monitoring group in Mozambique that would be in a position to advise the Government of Mozambique in formulating policies of environmentally-sound natural resources management to improve the health and quality of life of the people , and promote exports (for example , of seafood) ,

3. Help in building the national laboratory facilities at UEM , Maputo , that may evolve into a self-paying Environmental Research Center to serve the countries in the SADC (Southern African Development Cooperation) region.

The performance of the system development in the context of Mozambique will be assessed for its cost-effectiveness, environmental soundness and people-acceptability , and then adapted to the needs and situations in the other SADC countries.

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Draft Project Proposal

Joint project between the Department of Geology, College of Arts and Sciences, Lamar University, Beaumont, TX 77710, USA (Fax: +1-409-880-8007), and Faculty of Science, Universidade Eduardo Mondlane, C.P. 257, Maputo, Mozambique (Fax: +258-1-491557).

1. Title of the project: FORMULATION OF ENVIRONMENTAL MONITORING SYSTEMS FOR A LOW-INCOME DEVELOPING COUNTRY - A PILOT PROJECT FOR MOZAMBIQUE.

2. Background and justification:

2.1 Africa contains 27 out of the 43 low-income (i.e GNP of less than US $610 per capita per annum) countries of the world. It is now widely recognised that the problems of Sub-Saharan Africa are rooted in the degradation of soil, water and biota. The poor are both the *agents* and *victims* of environmental degradation. In certain clusters, population pressures have led to excessive use of soil, water and biota far beyond their capacity for regeneration. Improper agricultural practices (such as, tillage of slopes, cultivation without the addition of manure, burning of agricultural wastes, etc.), deforestation (for woodfuel and clearing of forests for agriculture) and overgrazing, have led to disastrous soil erosion. This has involved the loss of arable layer, and progressive reduction in the fertility of the soil and the nutrient elements of the crops and vegetables grown. The World Bank estimates that the loss in crop productivity due to soil degradation in the Developing Countries is of the order of 0.5 - 1.5 % of GNP.

2.2 Essential elements are trace elements which are needed by the body to perform certain critically important physiological functions (such as, enzyme activation). They therefore play a crucial role in the health and disease of humans and animals. The Recommended Dietary Intake (RDI, in terms of mg/d) are: Calcium (800), Phosphorous (800), Magnesium (300 - 350), Iron (10 - 18), Zinc (15), Manganese (2.5 - 5.0), Fluorine (1.5 - 4.0), Copper (0.15 - 0.5), Molybdenum (2.0 - 3.0), Chromium (0.05 - 0.2), Selenium (0.05 - 0.2) and Iodine (0.15). For instance the amount of iodine needed by man per year is as little as about 5g. If the intake is less, the person concerned develops goiter and if the person happens to be a pregnant woman, there is 1 to 10 % chance that the child born to her will be cretin.

3 The essential elements mentioned above either form complexes with humic acid in the humus, or get adsorbed on clays like illite, vermiculite, smectite, etc. Fine-grained clays (< 2um) in general and smectite clays in particular, have large negatively charged surface areas and have a correspondingly high Cation Exchange Capacity (CEC) over a wide range of pH. The CEC (in terms of in eq/ 100 g) is about 200 for humus, 30 for clays and only 5 for sand (> 50 u m). Thus, when soil is lost due to erosion, the humus and clay components of the soil are preferentially lost, leaving behind infertile sand. Consequently, soil erosion has serious adverse consequences not only in respect of the yield but also the nutrient content, of crops and hence the nutritional and status of the community. Several of the communities in Africa are dependent upon Aid food, wholly or partly. The implication is that the nutrients are added to the soils in the lands of the donor countries to produce food crops, but not to the soils of the countries where the aid food is consumed. The daily calorie intake is 1680 for Mozambique and is about 2100 for Sub-Saharan Africa (as against about 3400 in industrialised countries).

4 Other anthropogenic problems affecting the low-income, Developing Countries are the degradation of water resources (due to removal of vegetation cover, biological pollution, pollution due to agricultural chemicals and fertilisers, etc.), urban-cum–industrial pollution (municipal wastes, industrial effluents and emissions), impact of mining (degradation of land, water, soil, air and biota due to waste tips and mine effluents; mercury pollution due to artisanal gold mining), etc.

5 Mozambique does not have much industry. This, however, does not mean that Mozambique does not have to worry about industrial pollution. Whatever industries exist, they tend to be located near urban centres and discharge their effluents either into the sea or tidal streams or into municipal sewerage. Though the capacity of the industries is small, they are capable of causing disproportionately greater pollution due to outdated process technologies and due to the absence of monitoring facilities. Mozambique does not have modern analytical facilities and trained personnel to monitor the pollution (say, heavy metals and toxic substances at nanogram level) arising from industries and agricultural chemicals. Besides, in order to improve the exportability of seafood (say, shrimp) it is necessary to routinely monitor and provide certification about possible toxic substances (such as, methyl mercury).

6 The college of Arts and Sciences, Lamar University, has the necessary infrastructure and experience to mount the proposed program. Prof. Aswathanarayana, an Indian citizen, has long experience of over three decades

including 13 years in Africa) in institution-building, R. & D. and Training in respect of Geoenvironment (vide C.V. enclosed). The activities mentioned above will be coordinated by Prof. U. Aswathanarayana, in collaboration with Professor A.V.Murali, Department of Geology, Lamar University, who will be the project director.

3. Scope of work: Institutional capacity building in respect of environmental monitoring involves the establishment of analytical facilities and training of personnel at different levels to undertake the following monitoring activities:

(a) Essential elements in the cereals and vegetables grown in Mozambique, in order to determine ways and means of improving the nutritional content of food, and the clinical status of the community.

(b) Monitoring of soil, water, air and biota for potential pollutants and to understand the nutrient element mobility and deficiency/enrichment in the foods.

(c) Monitoring of deleterious constituents in exportable food items such as shrimp.

(d) Modelling of the dynamics of the environmental processes in order to understand the sources, pathways and residence times of nutrient elements in various media.

(e) Advising the Govt. of Mozambique in regard to the formulation of policies and programmes needed for environmentally compatible industrial and agricultural development.

4. Ouutput Of The Project: The project will focus on research and development, and training.

Research and Development:

(a) Essential elements, and their speciation in soils (in relation to their texture, CEC, pH, organic matter and humic acids, etc.), waters and crops, in order to understand what happens in the process of soil erosion, and to determine the most effective pathways of soil amelioration to improve the productivity and nutrient element of crops.

(b) Health effects of trace element deficiencies or excesses in diet and water.

(c) Contamination of soils, water and biota due to human and animal faeces, fertilisers and pesticides.

(d) Urban-cum-industrial pollution.

(e) Degradation of land, water, air and biota due to waste tips and mine effluents, with particular reference due to mercury pollution due to artisanal gold mining.

Training:

The Training component has outputs both in terms of software and hardware. The software output includes the preparation of course texts, manuals, numerical and interpretational exercises, simulation and modelling, laboratory and field exercises, etc. The hardware includes audio-visual aids, field kits and experimental ensembles.

5. Expected benefits from the project :The outputs of the project are expected to bring the following benefits:

5.1. To Mozambique, as a country

(a) An understanding of the environmental problems, and techno-socio-economic means of ameliorating them, in order to assist the government in policy formulation.

(b) Physical facilities to monitor the environmental parameters in respect of water, soil, air and biota, and "software" to model the environmental dynamics.

(c) Trained personnel to undertake environmental monitoring, in order to improve the health and quality of life of the people, and to promote exports of (say) seafood.

5.2. To SADC region in Africa:

(a) The performance of the system (sample collection, analytical procedure, equipment assembles, monitoring, policy formulation, etc) in the context of Mozambique will be assessed for its cost, effectiveness, environmental compatibility and people-acceptability, and then adapted to the needs and situations in the Southern African Development Co-operation countries.

5.3. Global Context:

Mozambique is the poorest country in the world (GNP $80 per capita), ravaged by 16 years of civil war. If the environment can be ameliorated in such a difficult situation, almost any other country should be able to do better.

6. Plan of work and output (Table I).

7. GEF Criteria:

Eligibility of GEF support: Based on principle 11 on Land Degradation (p.2 of GEF Working Paper, May, 1992), 2.0 - Education, Training and Research and institutional capability (p.32), and Protection of Bio-diversity, 5.3.4 Training and Research (p.38).

8. Tentative Budget (Table II).

TABLE I. Plan of work and outputs (Jan. 1994 to Dec 1996)

Period	Activity in Beaumont	Activity in Mozambique
Jan.1994 to June.94	I) Standardization of methods of sample collection, Preliminary processing, Storage and Shipment to be used by the Mozambique team II) Identification of the analytical procedures, and determining the most economical way of analyzing few hundreds to thousands of samples consisting of waters, soils, food crops, and fish by the analytical equipment at Beaumont.	Identification of the environmental problem of Mozambique. Appointment of Mozambican personnel, Field studies to collect samples of soils, waters and biota for being analyzed in Beaumont. Samples are to be analyzed at Beaumont during July-Dec.94 by Batch I.
July.94-Dec.94	Training (Batch I) of Mozambican personnel in the analysis of samples and their interpretation; Training in the modelling of dynamics.	Field studies by Mozambican personnel (Batch II). Samples collected by Batch II will be analyzed in Beaumont, Jan-Dec 95.
Jan.95-Jun.95	Training of the Mozambican personnel (Batch II) in the analysis of samples and their interpretation; Training in modelling of the Dynamics.	Follow up field studies by Mozambican personnel (Batch I)
June-Dec.95	Batch I participates in the preparation of environmental data base, under the supervision of Beaumont personnel.	Follow up field studies by Batch II
Jan-Dec 96	Preparation of policy guidelines, procedures and models for submission to the Govt. of Mozambique.	Establishment of analytical facilities, preparation of training manuals and standardization of procedures.

TABLE II. Project on "Formulation of Environmental monitoring systems for a low income Developing Country - A pilot project for Mozambique."
Tentative budget ('000 USD)

Item	1994	1995	1996	Total
A. ACTIVITIES AT LAMAR UNIVERSITY, BEAUMONT, USA				
I) Honorarium of the Project Director	10	10	10	30
II) Emoluments of the principal Investigator	90	90	90	270
III) International travel by the project director & Principal Investigator	15	15	15	45
IV) Personnel from Lamar University*	65	65	65	195
V) Equipment	280	--	--	~~280~~
VI) Consumable stores and spare parts	10	10	10	30
VII) Secretarial expenses and Telecommunications	20	20	20	60
VIII) Preparation of training manuals	10	--	--	10
IX)	10	10	10	30
X) Miscellaneous				
B. ACTIVITIES IN MOZAMBIQUE				
I) Salaries of Mozambique staff Batch I:4; Batch II:4; Total 8 @ USD 500/-pm	48	48	48	144
II) Field work of Mozambique staff	5	5	5	15
III) Sample collection and shipment	5	5	--	10
IV) Visits to Beaumont for training Batch I/II:4*6m/m=24m/m @USD 2000/-pm Round trip fare, Mapute-Beaumont-Mapute USD 3000 * 6 = USD 18000	42	42	--	84
V) Establishment of facilities in Mapute, standardization, Operation	--	--	~~120~~	~~120~~
	--	--	--	--
Total	610	320	393	1323

*Technician and a research assistant

Annexure 1 : Socio-economic profile of Mozambique

1. Mozambique has a population of about 16 million , and a land area of 80.2 million ha . This works out to 5 ha of land per capita , as against 0.4 ha of land per capita ,say , in India . It has good agricultural potential : 15 M ha of arable land i.e. about 20 % of the land area , and 26 M ha of forests , of which 4.6 M ha have excellent timber potential . Annual deforestation during 1981-85 has been estimated to be 0.12 M ha . Even so , Mozambique is the poorest country in the world with GDP per capita per annum of of USD 80 . The annual rate of inflation during 1980-90 was 38.8 % . Agriculture accounts for 65% of GDP . During 1989/90 , Mozambique received food aid of 493,000 t . Fertiliser consumption is extremely low (0.8 kg of plant nutrients per ha of arable land) and food crop productivity is low , about 0.5 - 1 t / ha for,say, maize . Official Development Assistance is USD 60.2 per capita , which works out to 65.7 % of GNP . Estimated average annual growth of population is 3 % , and consequently , children of less than 14 years constitute 44.1 % of the population .Daily calorie supply per capita is 1,680 (all figures are for 1990 ; source : World Bank Report , 1992 and UNDP reports) . The renewable supply of terrestrial water systems has been estimated to be 58 km^3 / yr . Annual withdrawl during 1970 - 87 was 1.8 km^3 which works at about 1 % of total water resources . The total per capita consumption is 53 m^3 (13 - domestic , and 40 - industrial and agriculture .

2 . Due to historical reasons, and due to civil war , the population in Mozambique tends to be clustered . More recently , the influx of returning refugees is leading to the opening up of new areas for agriculture . It has been estimated that that the number of Mozambican refugees returning from neighbouring countries , and displaced persons within the country , constitute about 20 % of the population . In certain clusters , population pressures have led to excessive use of soil, water and biota far beyond their capacity for regeneration . Due to pressure on land , farmers cultivate slopes using the same techniques as they do on level land , with serious consequences . When land is cultivated without manure or fertiliser , the soil nutrients are "mined" and consequently , the soil gets progressively impoverished . Deforestation (for fuelwood and to clear land for agriculture), farming to the edges of stream courses and burning of crop and vegetation residues. and in some cases , overgrazing , have led to disastrous soil erosion . The loss of soil has profound adverse consequences in terms of reduction in soil fertility and nutrient element content of food crops and vegetables , degradation of the hydrological regime , siltation of reservoirs, etc.

3 . The removal of vegetation cover increases the runoff and decreases the percolation and soil moisture . This leads to the degradation of hydrological regime and eco-system ,and adversely affects bio-diversity . Land degradation has other causes and dimensions . Illicit gold mining by artisanal miners (say , in Manica province) has degraded the land which can be ameliorated by vegetational methods . Erosional gullies are threatening habitations (say , in Guro area). Deforestation (for fuelwood) is destabilising sand dunes and is causing beach erosion (as in Xai-Xai area). Improper use of low-lying , water-logged , sandy soils (as in Manjacaze) is leading to the mineralisation of organic matter and acidification .

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Annexure 2

Plan of laboratory and field studies

1. The nutrient elements to be determined in soil , water , plants , cereal grains and in seafood etc are the following K Ca , P , Mg , Fe , Zn , Mn F, Cu , Mo Cl , Se and I

2. Toxic elements (heavy elements , such as Pb , Cd , Hg , and As) and compounds have to be tested in waters, soils , food-stuffs (cereals , vegetables seafod ,etc) . The relevant details in respect of water are given in Tables 4 3 and 4.4 in my book . The agricultural chemicals that need to be looked for in water ,soil and food items are Endrin , Lindane , Methoxychlor , 2,4 - D , 2,4,5 - TP silvex, Toxaphene , benzene , carbon tetrachloride , p-dichlorobenzene , 1,2 - Dichlorobenzene , 1 1-dichloroethylenene , Trichlomethane , Trichloroethylene , Vinyl chloride, Total trihalomethanes , defolaton , copper red , sumithion , fentrothion , kocide , gramaxone etc Though some of these chemicals are banned in USA, they continue to be used in Developing countries . Kokoszka, C and Flood , J W. (1989 " Environmental Management Handbook - Toxic chemicals and wastes " Marcel Dekker , New York , 632 pp gives a detailed account of toxic substances

3 The range of concentrations of essential nutrient elements needed by man , in soils and cereal grains are given in Table 1. The range of some heavy metals in natural materials and environments are given in Table 2 . The Federal Primary and Secondary Drinking Water Standards, prescribed by US EPA , are given in Tables 3 and 4 . **It follows from the above information that the analytical equipment ensembles to be chosen for the purpose should necessarily have to have the sensitivity and capability to determine various nutrient elements and toxic substances at microgram , nanogram to picogram levels** . For instance , mercury in drinking water should not exceed 0 002 mg / l (2 ppb), and endrin (an insecticide still widely used in Developing countries) should not exceed 0.0002 mg / l (0.2 ppb) . Inductively coupled plasma source mass-spectrometer (ICP-MS) is proposed to be used for these studies of various metallic constituents , and Infrared spectrometer is proposed to be used for some kinds of agrochemicals . Though at first sight ICP -MS appears to be expensive , it is recommended to be used for the following reasons : (i) it can determine the constituents at the expected levels , (ii) it does not need much sample processing , thus minimising the problems of blanks , (iii) It is fast and most importantly , it is **cost effective** . The cost-effectiveness becomes an important consideration as the National Facility that will be established in Mozambique at the end of the project , is expected to provide commercial chemical analytical service for various kinds of materials , such as soils , minerals , wawaters , food stuffs , agrochemicals , industrial effluents , etc.

4 . For the land husbandry project , we have chosen two areas (i) Manica - Machipanda area in Manica Province , and (ii) Chicomo - Manjacaze area in Gaza province (vide general map of Mozambique , showing the project areas , and the topographic maps of the two areas on 1 250,000 scale) Apart from these two , three other areas could be recommended Land degradation caused by population pressure , and improper agricultural practices are common in all these areas

(i) Manica - Machipanda area in Manica province : Hilly area near the Zimbabwe border . High slopes of land (20 - 35 %) , and ferralitic soils of low fertility . Rainfall range , 1000 - 1400 mm.

(ii) Chicomo - Manjacaze area in Gaza province : The environment is dominated by the Limpopo River which flows through the Xai-Xai graben . The sides of the graben and the high lands are composed of lateritic , sandy soils , and there are water-logged , peaty soils in the low-lying areas of the palaeo-delta of the river . Rainfall (600 - 800 mm) is erratic

(iii) Boane , near Maputo city , in Maputo province : Volcanic soils derived from basalts and rhyolites (Karroo volcanics) . Rainfall 600 - 800 mm

(iv) Namiolo , Nampula province : Soils derived from migmatites Gentle slopes . Cotton mono-cropping , without regular fertilisation , is reducing the fertility of the soils .

(v) Angonia , Tete province : Granulites of the Mozambique Belt good rainfall (1600 - 2000 mm). Intensive agriculture .

The enclosed map shows the five districts chosen .

Annexure 3 : Programme of training of Mozambicans at Lamar

The trainees will be drawn principally from the Faculties of Science (Geology , Chemistry , Biology) and Agronomy, of UEM The programme of training will be (i) interdisciplinary , and (ii) oriented to the needs of Mozambique , and similar low-income Sub-Saharan African countries

Two months An intensive, custom-made course of theoretical , laboratory and field instruction , about the various components of the environment , their linkages and interactions , Environmental Modelling , Environmental Impact Assessment , Environmental Monitoring , Environment and Development . Economics and legislation , Government Policy options ,etc

Two months Sample preparation in respect of soils , water , biota , foodstuffs ,etc. Instrumental chemical analysis involving ICP - MS , Infrared spectrometers , and other kinds of analytical equipment

Two months Data processing and analysis Computer simulation of environmental dynamics Environmental monitoring and environmental data bases .

The scheme given above is tentative , and can be adjusted as needed

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Annexure 4 . Responsibilities of the principal project personnel

1. Principal Investigator / Coordinator : Professor U Aswathanarayana He has long experience (including 13 years in Africa) in institution building , Research and Development and Training . He is a geochemist who has specialised in environment-friendly utilisation of natural resources . He will be responsible to plan and coordinate the work in Lamar University and the Universidade Eduardo Mondlane , in respect of field studies in Mozambique , and training in Lamar , giving instruction in environmental science and preparation of training manuals , establishment of the National Facility for environmental monitoring in Maputo , and commercialisation of its activities .

2. Project Director (Lamar University side) : Professor A.V. Murali , Professor of Geology, Lamar University . He is a specialist in trace element analytical chemistry , having worked earlier in the Atomic Energy Commission of India , and NASA - Johnson Space Center in Houston , Texas . He will be responsible for setting up and calibration of the instrumental ensembles at Lamar , and standardising the analytical procedures , building up of the data bases , etc.

3. National Project Director : Dr. Isidro Manuel , Ph.D Geology , and Deputy Dean , Research and Development , Faculty of Science , Universidade Eduardo Mondlane , Maputo . He will be responsible to coordinate the project from the Mozambique side . He will identify the Mozambican personnel for the project . In collaboration with the Principal Investigator , he will plan the field studies and follow-up activities in Mozambique .

Table 1

Abundance of essential elements in the relevant media ($\mu g\ g^{-1}$)

Element	Atomic number	Abundance in crust	Abundance in soils	Abundance in cereals (dry wt.)
Calcium	20	45,000	15,000	
Phosphorus	15	610	800	
Magnesium	12	16,400	5,000	
Iron	26	35,900	40,000	17 (corn)
Zinc	30	127	90	16 - 35
Manganese	25	720	1000	12 - 80
Fluorine	9	585		0.2 - 2
Copper	29	32	30	2.2 - 6.7
Molybden.	42	1.7	1.2	0.35 - 0.92
Chromium	24	71	70	0.014 - 0.2
Selenium	34	0.05	0.4	0.02 - 0.45
Iodine	53	0.45	0.05 - 10	0.06 - 0.1

The levels of concentration of heavy elements in various media are summarised in Table 2 //

Table 2

Concentration levels of various heavy elements

	Pb	As	Cd	Hg
Crust (mg / g or ppm)	13	1.8	0.11	0.05
Fresh water (mg/l or ppb)	1	0.5	0.1	0.1
Upper limit for potable water (mg/l or ppb)	50	50	5	1
Unpolluted fresh water (mg/l or ppb)	< 1 - 10	< 1 - 10	0.01-1	0.0001-1
Polluted fresh water (mg/l or ppb)	20-100	10-1000	1 - 010	< 1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	100-1000	100-5000	100-700	
[illegible] (sewage / industrial/mining) (mg/l)	100-2000 - 140,000	140	6-220	/
Ocean water : Surface water (ng/l)	5 - 15	2000	3-10	10-30
: Deep water (ng/l)	< 1 - 2	3500	25-112	70-1100
Atmospheric concentrations in unpolluted areas(ng/m^3)	0.63	0.007	< 0.015	-
Atmospheric emissions ($\times 10^6$ kg / yr) : Natural	5.9	2.8 +21.6*	0.29-1.5	0.04+25.0*
: Anthropogenic	2000	78.0	0.7-8.1	11.0
Fresh water sediments (ug/g) : unpolluted	10-33	2.7-13.2	1.5-2.1	0.07-1.5
: polluted	88	79-760	0.4-5.6	0.4 - 860
Ocean sediments (ug/g) Background	5 - 6	-	0.13-0.6	0.1-0.35
Contaminated	20 - 320	-	11 -25	2010
Edible plants (ug/g)	0.2 - 20	0.01-15	0.05-2.0	0.013-0.11
Human tissues (mg/70 kg.- reference person)	40-120	18	50	13

* dust + vapour

// Compiled from various sources , principally Fergusson (1989).

Table 3

Federal Primary Drinking Water Standards (U S E P A)

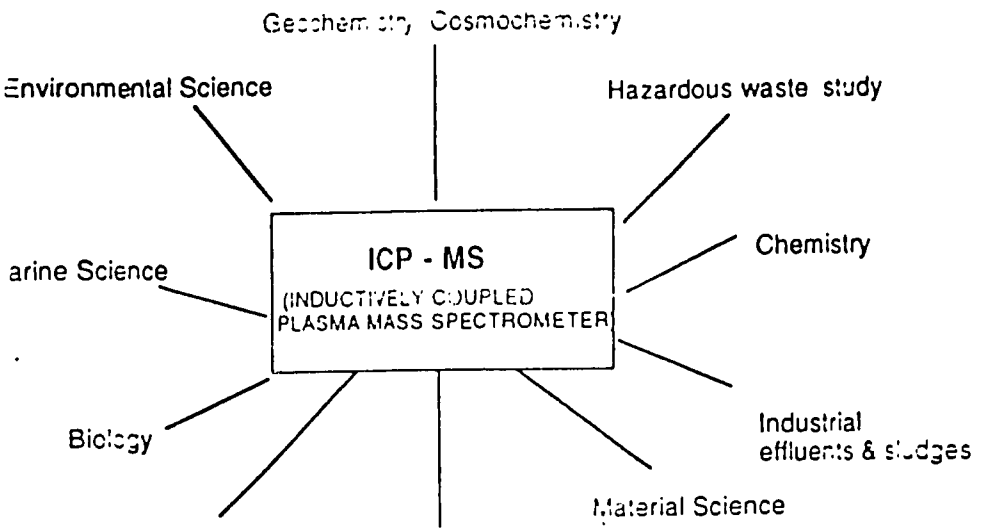
Contaminant	Source	Maximum contaminant level (mg/l)
Total coliforms	Human and animal faecal matter	1 per 100 ml
Turbidity	Erosion, runoff discharges	1 - 5 turbidity units
Arsenic	Geological, mining, smelting	0 05
Barium		1 0
Cadmium	Geological mining, smelting	0 01
Chromium		0.05
Lead	Leaches from lead pipe and lead-based solder pipe joints	0 05
Mercury	Paint, paper, vinyl chloride, fungicides	0 002
Nitrate	Geological Fertiliser, sewage, feedlots, geological	10
Selenium	Geological, mining	0 01
Silver	Geological, mining	0 05
Fluoride	Geological, additive to drinking water, toothpaste	4
Endrin (cancelled	Insecticide used on cotton, small grains, orchards	0.0002
Lindane	Insecticide used on seed and soil treatment, foliage application, wood protection	0.004
Methoxychlor	Insecticide used on fruit trees, vegetables	0.10
2,4-D	Herbicide used in agriculture ; forests, range, pastures and aquatic environments	0.1

Table 3 (contd.)

Contaminant	Source	Maximum Contaminant level
2,4,5-TP silvex (cancelled)	Herbicide	0.01
Toxaphene	Insecticide used on cotton, corn, grain	0.005
Benzene	solvent used in chemical industries, phramaceuticals, pesticides, paints and plastics	0.005
Carbon tetrachloride	Common in cleaning agents, industrial wastes for the manufacture of coolants	0.005
p-Dichlorobenzene	insecticides, moth balls air deodorizers	0.075
1,2,-Dichloroethane	Insecticides, gasoline	0.005
1,1-dichlomethylene	Plastics, dyes, perfumes, paints	0.007
1,1,1-Trichlomethane	Food wrappings, synthetic fibres	0.02
Trichlomethylene	Waste from dry cleaning materials,pesticides, paints, varnishes	0.005
Vinyl chloride	Polyvinyl chloride (PVC) and waste from plastics and synthetic rubber	0.002
Total trihalomethanes (TTHM)	Forms when surface water with organic material is treated with chlorine	0.10
Gross alpha particle activity	Radioactive waste, uranium deposits	15 picocuries / l
Gross beta particle activity	— do —	4 millirems /yr
Radium 226 and 228 (total)	Radioactive waste, geological	5 picocuries / l

Table 4
Federal Secondary Drinking Water Standards (U S E P A)

Contaminant	Level
pH	6 5 - 8 5
Chloride	250 mg/l
Copper	1.0 mg/l
Foaming agents	0 5 mg/l
Sulphate	250 mg/l
Total Dissloved Solids (TDS)	500 mg/l
Zinc	5.0 mg/l
Fluoride	2.o mg/l
Colour	15 colour units
Corrosivity	Non-corrosive
Iron	0 3 mg/l
Manganese	0.05 mg/l
Odour	3 threshold odour no.



1) Industrial samples
(Great potiential to
earn revenue to the
university)

2) Teaching Courses in applied
Geochemistry, and Job training for
students.

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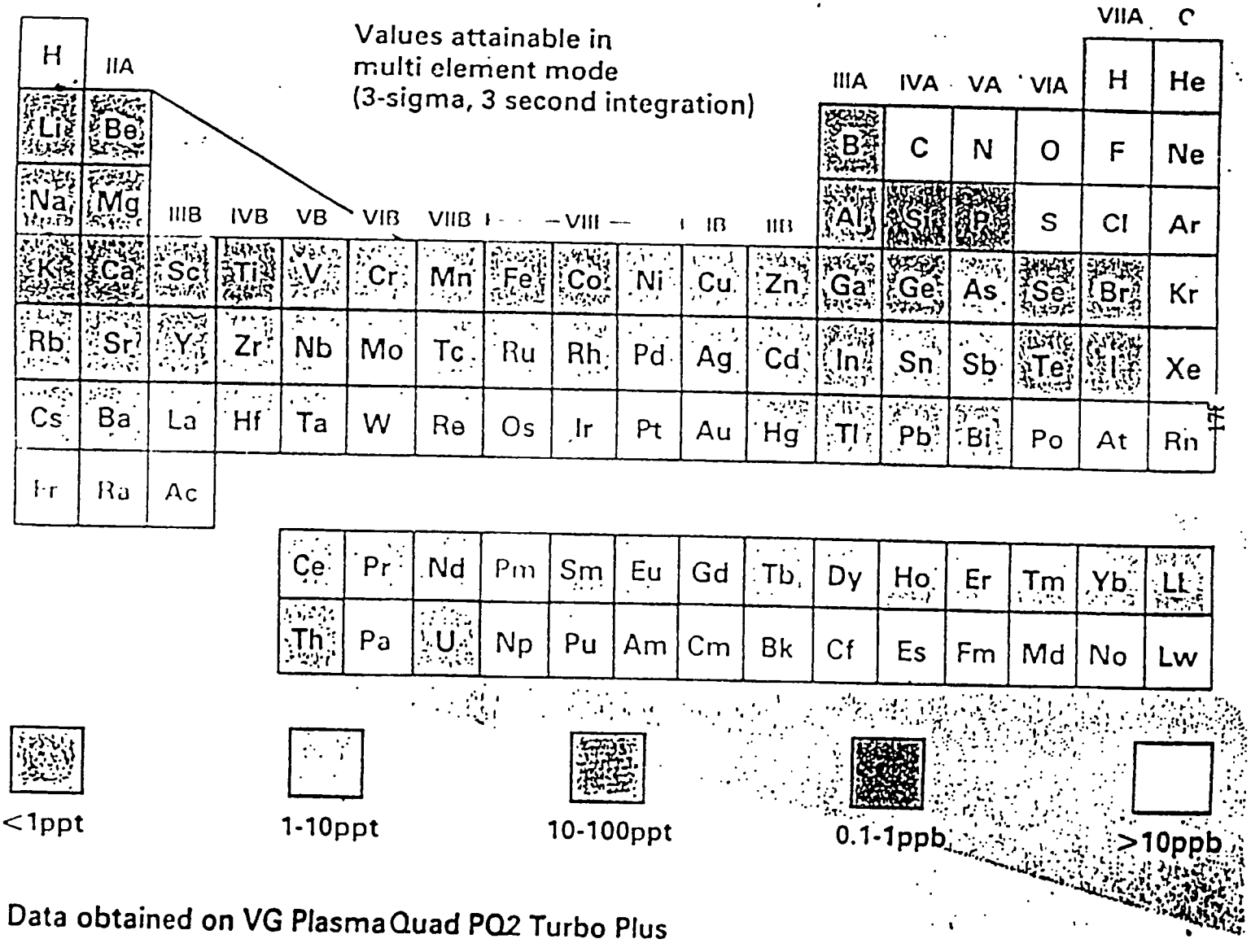
Encl: 1

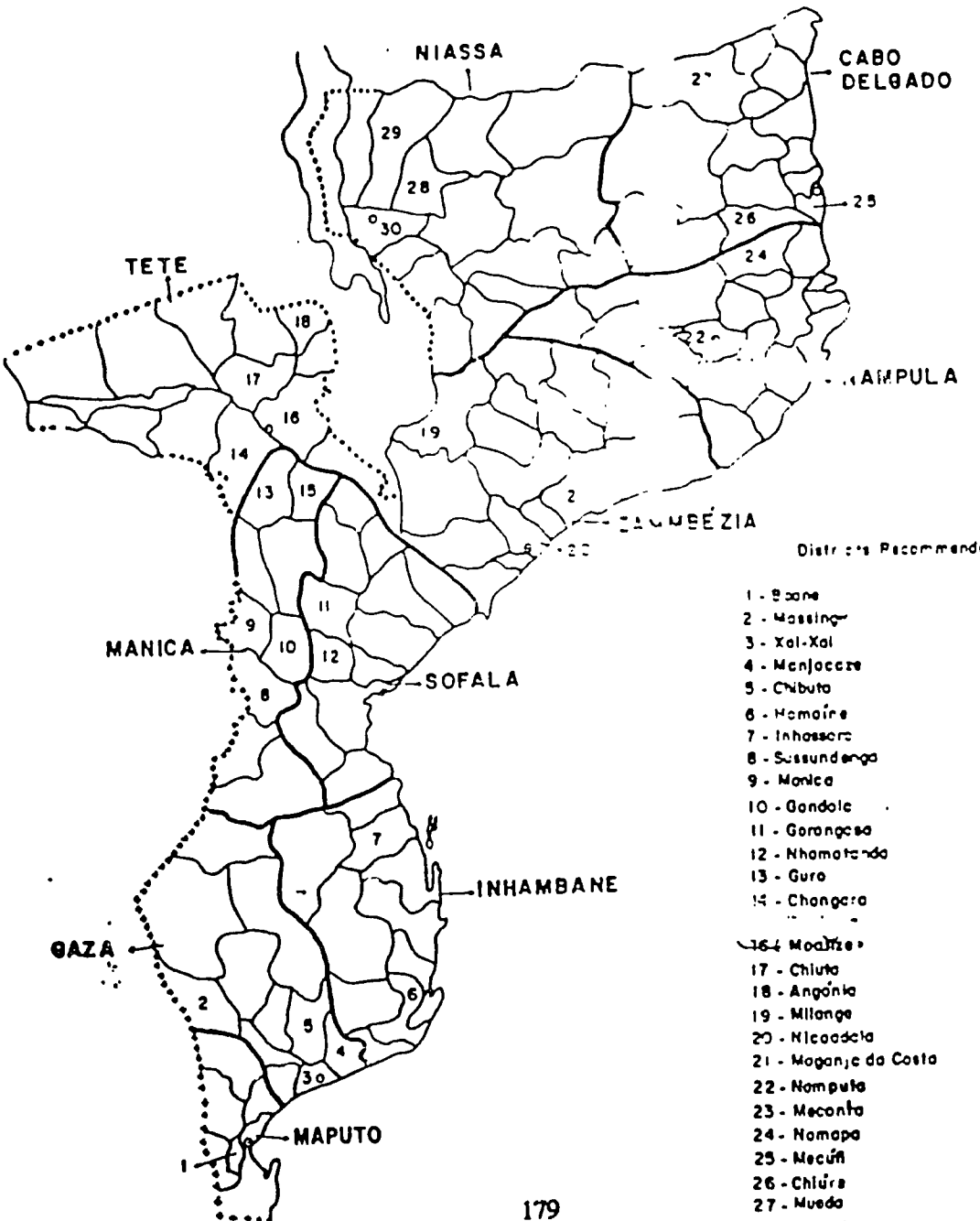
Values attainable in
multi element mode
(3-sigma, 3 second integration)



Data obtained on VG PlasmaQuad PQ2 Turbo Plus

REPUBLIC OF MOZAMBIQUE

MAP OF RECOMMENDED DISTRICTS



ANNEX G. POSSIBLE TRAINING PROGRAMS AND SCOPE OF WORK FOR PESTICIDE ADVISOR/MONITOR

G.1 Illustrative Outline of Training in Integrated Pest Management and Pesticide Management, with Budgets.

G. 2. Illustrative Scope of Work and Budget for a Pesticide Advisor/Monitor.

Annex G.1 Illustrative Outline of Training in Integrated Pest Management and Pesticide Management

It is USAID policy to promote Integrated Pest Management (IPM) in its agricultural projects whenever possible. To that end a "hands on", 40-hour IPM "short course" with the following topics and times is suggested:

IPM Topics	Hours
Introduction: Why should pesticide use be minimized? Impact of pesticides on natural control: pest resurgence, secondary pests, pest resistence to pesticides, health and environmental hazards	2
What is IPM? Principles and illustrative case studies	2
Location and identification of pests, natural enemies and crop pest damage. Hands on field sessions with damage vs. yield experiments if course length permits	5
Life cycles, disease epidemiology and ecological interactions, including predation and parasitism, with experiments on predation and parasitism rates and pesticide impact on beneficials, with live insects and spiders.	6
Cropping methods that prevent pest infestation	2
Pest-resistant crop varieties and how to take advantage of them	2
How to protect and encourage naturally-occurring predators and parasites of insect pests, with field experiments if course length permits	2
Opportunities for classical biological control	1
Stages of the crop and their relative ability to compensate for pest damage, with experiments if course length allows	2
Crop scouting and pest control decision making (agroecosystem analysis to decide when pest	

control action is needed) 10 hours in daily 2-hour sessions, group field practice and decision making and discussion	10
Nonchemical pest control methods (eg. hand picking of large pests, rouging infested seedlings, barriers, etc., field practice and experiments if time permits	2
Selective pesticide application methods, with field practice and experiments	2
The economics of IPM, with case studies or actual field analysis	2
Total	40

NOTE: The above IPM course would best be given in weekly short "classes" in the field for the duration of an entire cropping season, with topics taken up in the order they are relevant for crop management. An intensive 1-week session is possible, but must be held in the field during the cropping season when the field ecology allows observations and experiments covering the major topics. In a season-long course, there would be much less time spent on descriptive lectures and much more on discovery learning in the field.

In either case, the course should be taught in a participatory manner that teaches trainees to experiment, demonstrating principles and discovering important knowledge for themselves, and that gives them repeated, supervised practice with key skills such as pest and natural enemy identification, field scouting and pest control decision making.

Pesticide Management Training

Realizing that IPM often requires the rational use of some synthetic pesticides, the following practical 3-day course on pesticide management is suggested:

Pesticide Management Topics	Hours
The pesticide problem worldwide and in Mozambique	0.5
Concepts of agroecosystems	1.0
Concepts of integrated pest management	1.5
Pesticide toxicology: emphasis on local pesticides	1.0
Pesticide formulations	0.5
Elements of chemical control	1.0
Pesticide poisoning and first aid	1.0
Protection of pesticide handlers, mixers/loaders, applicators and field workers	1.0
Pesticide labels	1.0
Disposal of unwanted pesticides and pesticide	

containers	1.0
Pesticide storage: emphasis on "planned purchase"	1.0
Pesticide application equipment	1.0
Equipment calibration	5.0
Pesticide safety, including protective clothing and apparatus	1.0
Pesticide rate calculations	1.0
Factors that affect foliar-applied pesticides	1.0
Factors that affect soil-applied pesticides	1.0
Total	24.0

Integrated Pest Management/Pesticide Management Training - Human Resource Development

Options and Budget Estimates

--Institutionally Sponsored IPM/PM Courses:

Participant number:	28
Days for workshop :	4
Method of payment :	PVO grant line item
Location :	Southern Africa
Per diem @ $180	$25,200
Tuition ($3500)	98,000
Travel (air ticket = $320)	8,960
Supplies @ $20	560
total	$132,720

--U.S. Designed IPM/Pesticide User Training Workshops:

Participant number:	28
Days for workshop :	5 (1 day for training of trainers)
Method of payment :	PVO Support Project
Consulting days :	120
Consultants :	3
Workshop sessions :	2 (one each: IPM and Pesticide Mgt.)
Location :	Mozambique

Salaries and benefits	$27,840
Consultant per diem @ $180	11,340
Participant per diem @ $180	30,240
Travel ($5000 for air ticket)	30,000
Participant travel @$100	2,800
Others/supplies	920
Overhead (25% of costs)	25,785
Award fee (10%)	12,893
Total	$141,818

--Private Sector IPM/Pesticide Mgt. Workshops

Participant number: 28
Days for workshop : 4
Method of payment : PVO grant line item
Workshop sessions : 2 (one each: IPM and Pesticide Mgt.)
Location : Mozambique

Per diem @ $180	$5,040
Travel @ $100	2,800
Others/supplies	920
Tuition ($1500)	42,000

total $50,760

--Private Sector Pesticide User Training Workshop:

Participant number: 280 (10 workshops)
Days for workshop : 1
Method of payment : Purchase agreement
Location : Mozambique/on site

Travel @ $100	$28,000
Others/supplies	4,200

total $32,200 (10 workshops)

--In-Country IPM Consultant

Consultants : 1
Consulting days : 40
Method of payment : PVO grant line item
Location : Mozambique/on-site

Salaries and benefits	$9,280
Per diem @ $180	10,080
Travel ($5,000 for air ticket)	5,000
Others/supplies	400
Overhead (25% of costs)	6,190
Award fee (10%)	3,095

total $34,045

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Annex G.2 Scope of Work and Illustrative Budget for a Short-term PVO Support Project Pest and Pesticide Management Advisor/Monitor

Specific, ongoing responsibility must be assigned to qualified pest/pesticide management resource person(s) for helping PVOs implement pesticide hazard mitigation measures prescribed in this SEA, and for monitoring compliance on an ongoing basis. These advisor/monitor(s) should also facilitate the timely follow-up of SEA recommendations.

The following scope of work could be carried out either by a consultant engaged on a long-term basis to provide technical support (including periodic visits to the project), or by one or more other specialists whose services are available to USAID/Mozambique, such as REDSO staff or the Africa Bureau Environmental Advisor. Proposed activities are described in greater detail in the SEA.

Scope of Work for Advisor/Monitor

- Monitor PVO compliance with mitigative measures prescribed in 6.2.1.1 of this SEA through comprehensive annual visits to PVO field sites including unannounced observation of pesticide safety and management practices of PVO staff and farmer beneficiaries;

- Facilitate timely follow-up of recommendations made in 6.2.1.2 of this SEA (see below);

- Help project PVOs find and test effective non-chemical pest control methods, implement IPM, and use pesticides safely and judiciously by facilitating active and lasting communication and collaboration among PVOs and between them and national and international sources of IPM/pesticide management information and technical assistance;

- Advise PVOs on choice of pesticides in accordance with the guidelines in this SEA;

- Organize annual Mozambique PVO IPM workshops with USAID or other donor funding and technical input from DSV/DANIDA;

- Help the USAID Africa Bureau and collaborating international PVOs organize and present an international IPM workshop (or a series of regional workshops) for African PVOs;

- Perhaps with the assistance of a specialist consultant in participatory, non-formal adult education, help project PVOs design appropriate IPM and pesticide safety/management training courses for all users of pesticides in their programs, including field laborers and farmer beneficiaries;

    - An intensive, U.S. EPA-standard pesticide applicator training course must be presented for PVO staff who will apply EPA Restricted Use Pesticides or other very toxic products. Only personnel who pass the course will be authorized to

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use such pesticides, and they should be re- trained and re-tested periodically.

- Courses should be planned in consultation with, and, where appropriate, presented collaboratively with, other projects and agencies with similar training needs.

- Help arrange appropriate IPM and-pesticide-related training, includi postgraduate scholarships and international study tours, for Mozar can counterpart officers in the areas of agriculture, public health and vironmental protection;

- Arrange for PVOs to help implement government and donc nvironmental monitoring programs in their zones of operation; and

- Inform the USAID/Mozambique ADO About any evid ce of agricultural inputs being provided to farmers on a subsidized bas from any source.

A consultant Pest and Pesticide Management Advisor/Mc tor would be required to make a long visit (of about two months) annually. The first vi t should probably be longer--at least three months, including substantial get-acquainted/fact finding visits to PVO field sites and the organization and presentation of the initial national-level IPM workshop. Provision would have to be made for paid time during the rest of the year so that the Advisor/ Monitor can respond on demand to long-distance requests for information and technical assistance.

Scott Hudson, ATLAS and HRDA Project Manager, USAID/Mozambique prepared this illustrative budget covering two Advisor/Monitor consultancy visits. (Note: these visits are shorter than is being proposed above, and the consultant's daily rate and the proportion of time spent in Maputo will affect costs strongly.)

Consultants:	1
Consulting days:	40 first visit, 30 subsequent
Method of payment:	PVO grant line item
Location:	Mozambique on-site

Salaries and benefits:	$ 9,280
Per diem @ $180	10,000
Air travel ticket	5,000
In-country travel	4,500
Supplies/misc.	800
Overhead (25% of costs)	6,190
Award fee (10%)	3,095
TOTAL	$38,945

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