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SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
FOR USAID ASSISTANCE FOR
LOCUST/GRASSHOPPER AND ARMYWORM
CONTROL
IN TANZANIA

United States Agency for International Development
Mission to Tanzania
In Cooperation with
the Government of the Republic of Tanzania

Dar es Salaam, Tanzania

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**AGENCY FOR INTERNATIONAL DEVELOPMENT
BUREAU FOR AFRICA
Disaster Response Coordination
AFR/AA/DRC**

COUNTRY SPECIFIC SUPPLEMENTARY ENVIRONMENTAL ASSESSMENT (SEA)
TO THE PROGRAMMATIC ENVIRONMENTAL ASSESSMENT (PEA)
FOR LOCUST AND GRASSHOPPER CONTROL IN AFRICA AND ASIA

FINAL ACTION FORM

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ACRONYMS AND ABBREVIATIONS

AChE	Acetyl-cholinesterase, a blood enzyme, tested for exposure to organophosphate pesticides
AELGA	African Emergency Locust/Grasshopper Assistance Project
AID/W	U.S. Agency for International Development, Washington, D.C.
APHIS	Animal and Plant Health Inspection Service of USDA
aw	armyworm
CFR	U.S. Code of Federal Regulations
CSH	Consultant and Specialised Hospitals
D	Dispensary
DLCO/EA	Desert Locust Control Organization for Eastern Africa
DOE	Department of Environment
DOF	Department of Forestry
DOWL	Department of Wildlife
DPPO	District Plant Protection Officer
DPPR	District Plant Protection Representative
DRH	District and Rural Hospitals
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
GDIS	General Directorate for International Support
GOT	Government of Tanzania
GPS	Global Positioning System
ha	hectare
IFAD	International Fund for Agricultural Development
IPM	Integrated Pest Management
IRLCO/CSA	International Red Locust Control Organization for Southern and Central Africa
IITA	International Institute of Tropical Agriculture
km	kilometer(s)
l	liter(s)
l/g & aw	locust/grasshopper and armyworm
mg/kg	milligram per kilogram (body weight)
MOA	Ministry of Agriculture
MT	Metric tons
MTNRE	Ministry of Tourism, Natural Resources, and Environment
MOH	Ministry of Health
MPCU	Migratory Pest Control Unit
NEAP	National Environmental Action Plan
NGO	non-governmental organization
PEA	Programmatic Environmental Assessment
PPD	Plant Protection Division
ppm	parts per million (1 part/1,000,000 concentration)
PVO	Private Voluntary Organization
REDSO/ESA	Regional Economic Development Support Office for Eastern and Southern Africa
RH	Regional Hospitals

RHC	Rural Health Centers
rl	red locust
RPPPO	Regional Plant Protection Office (r)
SEA	Supplementary Environmental Assessment
TOHS	Tanzanian Occupational Health Services
TPRI	Tanzanian Pesticide Research Institute
UNDP	United Nations Development Program
ULV	Ultra-low volume application of pesticides (normally 1 liter per hectare or less of the technical grade)
USAID/Tanzania	USAID Mission to Tanzania, located in Dar es Salaam
USDA	U.S. Department of Agriculture
VEO	Village Extension Office (r)
VHP	Village Health Posts

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PREFACE

This SEA complements the USAID's Programmatic Environmental Assessment (PEA) for Locust/Grasshopper Control Programs in Africa and Asia (TAMS/CICP, 1989) and shares some commonalities with other similar SEAs. The SEA was prepared by Dr. Yeneneh T. Belayneh, the Assistant Technical Advisor to the AELGA Project, with assistance from USAID/Tanzania, and based on information gathered during the various interviews and from documents obtained from various Ministries of the Government of Tanzania (GOT), and through field visits to areas affected by locusts/grasshoppers and armyworm (l/g and aw). A two week tdy to Tanzania by Belayneh obtained first hand information from USAID/Dar es Salaam and various government agencies of the GOT, and non-governmental organizations in the country. List of persons contacted and interviewed during preparation of this SEA is provided in Appendix I. The current SEA, unlike the l/g SEAs developed for other countries, also addresses armyworm operations as per the recommendations of the Bureau Environmental Officer (Appendix II).

This document reflects the current description of the Tanzania Plant Protection Department and its procedures for l/g and aw management and control operations. It contains the best available analysis of possible environmental impacts that could result from l/g and aw control operations and alternative strategies for mitigating such impacts. It provides recommendations on research and training programs in improved safety, public health, environmental protection, integrated l/g and aw management strategy, including support for early survey and prompt treatment strategies. It emphasizes and promotes the search for and the use of alternatives to the chemical control and encourages initiation of research program in biological control of l/g and aw. The SEA underscores the importance of judicious and environmentally sound approaches to the use of pesticides whenever and wherever necessary.

This SEA fulfills the requirements by the USAID to provide funds for any possible programs related to l/g and aw management and control activities in Tanzania.

1.0 EXECUTIVE SUMMARY

The Programmatic Environmental Assessment (PEA) for Locust and Grasshopper in Africa and Asia (TAMS/CICP, 1989) adequately covers locust/grasshopper (l/g) operations in Africa and Asia. It also provides guidelines for rational pesticide use and identifies and lays out measures to mitigate potential negative impacts associated with l/g control options. However, the PEA does not address armyworm (aw). In recognition of this gap and owing to the importance of aw in sub-Saharan Africa which often leads to constant need for technical assistance and other forms of support, and the inclusion of other emergency pests as part of the mandates of the AELGA Project, a memorandum was issued (August 9, 1994) by the Africa Bureau Environmental Officer and cleared by appropriate offices and the General Council (GC) to amend the existing SEAs for l/g to include aw (Appendix II). Based on the recommendations of subject memorandum, L/G SEAs for Ethiopia and Eritrea were amended to include aw control. This precedence was fully utilized in the process of developing the L/G and AW SEA for Tanzania, and it was considered logical, time saving, and economical to develop an SEA for l/g and aw in stead of developing a separate SEA for l/g and amending it later to include aw.

This L/G and AW SEA complements the 1989 PEA for Locust and Grasshopper. It provides specific information on the country profile and agro-ecological regions (zones) as related to the locust/grasshopper and armyworm (l/g and aw) problems and control options in Tanzania. It furnishes information on program operations and options regarding l/g and aw control interventions, and identifies foreseeable significant effects such operations may have on the environment and on target populations.

This SEA is a prerequisite for any pesticide-related assistance to be given to the host country by the USAID as part and parcel of the USG's action plan for pest and pesticide management programs in Tanzania. The information given in the SEA is intended for use by the USAID (Tanzania and Washington), the Tanzania Ministry of Agriculture (MOA), Department of Plant Protection (PPD), and other potential participants including the NGO/PVO community, in the process of designing l/g and aw management programs should it involve USG assistance. The SEA may be amended whenever valuable information that can be utilized in the process of designing sound l/g and aw management programs becomes available and when such information necessitates an update.

If USAID chooses to participate in a l/g and aw assistance program, it is recommended that an Action Plan be developed which clearly outlines specific tasks to be undertaken. It is also important to note that support be coordinated with other donors and the GOT to achieve desirable results and to make a significant impact. In addition to the PPD, regional locust control

organizations, the Desert Locust Control Organization for Eastern Africa (DLCO/EA) and the International Red Locust Control Organization for Central and Southern Africa (IRLCO/CSA), to which Tanzania is a member, have been and still are the key players in l/g and/or aw control operations in Tanzania, and these organizations should be involved in the initial stage for developing control operations and programs. Assistance for such a program should emphasize principles of IPM, in which all available management resources are considered. While probable crop loss that could severely impact food security and self-sufficiency will be a criterion for USAID involvement in pest control efforts, sustainable infrastructure development and cost/benefit ratio should also be considered. Participation by USAID in emergency operations will be carefully examined in terms of long-term benefits that could be achieved in addition to an insect population decrease. USAID will normally emphasize good survey and use of non-chemical control methods whenever and wherever possible.

IMPACTS OF LOCUSTS/GRASSHOPPERS AND ARMYWORM ON CROP PRODUCTION IN TANZANIA

L/G and aw problems are quite often manifested in Tanzania. Certain parts of the country, including southern, southwestern, central, eastern, western, northwestern, and northeaster parts of the country are known to experience periodic and frequent outbreaks and infestations of locusts and/or armyworm, the latter being annual occurrence. Most recently, between 1991 and 1995, red locust and/or armyworm outbreaks severely affected most of the country. It is highly likely that such outbreaks will continue to occur, calling for appropriate intervention options. Furthermore, periodic requests for technical assistance, equipment, pesticides, and application services are likely to follow.

Despite the fact that l/g and aw are known to cause serious economic losses in the agricultural sector of the country, there seem to be few initiatives in the areas of l/g and aw research in the country. Further research projects/programs should be encouraged and supported in the areas of pest and pesticide management in Tanzania to determine the level of economic losses that result from infestations by these pests and such information should be used in the development of better decision-making tools for effective intervention strategy. Strong collaboration between GOT (PPD and other divisions of the Ministry of Agriculture (MOA), the Department of Environment (DOE), etc.), potential NGOs/PVOs, Universities, as well as the private sector should be promoted and encouraged in order to improve the current delivery and control operations.

PREVENTION AND EARLY WARNING

Working with potential players, USAID/Tanzania could be influential in promoting linkages and collaboration between the different sectors, including GOT, the private sector, regional and

international organizations, and other donor agencies. Nevertheless, USAID should ensure that requests for assistance are objectively justifiable, based on reliable data that could reflect perceived levels of damage and associated requests. Under such circumstances, USAID's focus should be based on proactive and preventive modality that should emphasize early intervention rather than late season, campaign type treatments as the latter should be minimized to the extent possible.

Moreover, the level and means of response should be based on careful analysis of habitats to be treated, and the need for such measures should be established. In the event assistance is contemplated, USAID should encourage PPD to prepare annual work plans describing intended campaign operations and ensure how the SEA recommendations will be carried out. The use of meteorological data coupled with information based on greenness maps and other remotely sensed data as a means to enhance early warning systems, should be strengthened, and their wider implementation as a tool for surveillance be encouraged.

CAPACITIES AND NEEDS OF THE PLANT PROTECTION DEPARTMENT

Tanzania's PPD is headquartered in Dar es Salaam, with the Regional Plant Protection Offices (RPPPO) stationed in each of the 20 regions. In addition, there are close to 120 District Plant Protection Offices (DPPPO) in each district throughout the country. Each district has a network of Village Extension Officers (VEO) throughout the country.

The current PPD which was restructured in 1985, is composed of four units -- Product Inspection and Phytosanitary Service, Migratory Pest Control Unit (MPCU), Rodent and Vermin Control, and Pesticides and General Advisory Services. For the second time, the PPD is being subjected to restructuring. The proposed restructuring focuses on specific core-functions, each with a number of sub-functions. The core-functions being -- policy aspects and formulation, regulatory services, migratory pest services, integrated pest management, and training and development. It is worth noting that the proposed restructuring is still at a concept level.

The level of expertise in the PPD in general, and the MPCU, in particular needs to be strengthened. Expertise is lacking in areas such as ecotoxicology, environmental monitoring, and pesticide management, including disposal issues. Any efforts to strengthen the PPD should go far beyond l/g and aw and other migratory pests and should deal with the full range of pest problems known to cause economic damage. MPCU has the technical capacity for survey, monitoring, and forecasting of armyworm in particular. Nevertheless, pest management staff should be strengthened in specific areas including crop loss assessment, biological control, insect pathology, ecotoxicology, and environmental monitoring and risk assessments. Furthermore, the unit could benefit from

equipment necessary for survey and monitoring, such as communication radios and GPS and could, without any doubt, benefit from technical assistance and training opportunities in the fields of pest and pesticide management, biological control, environmental impacts and risk assessments, phytosanitary, and other relevant fields. Training programs should reflect the country's needs and should be based on priority areas.

PPD has been or is being supported by other international donors including, GTZ, EEC, CIDA, and FAO (mainly through the technical cooperation projects). This SEA commends the actions taken by these agencies and suggests that such actions should be emulated by others. The SEA would also like to underscore the role that NGOs, PVOs, and the private sector, including pesticide companies, could play a key role in educating farmers and agricultural advisors in safe use and handling of pesticides.

IPM IN LOCUST/GRASSHOPPER AND ARMYWORM CONTROL PROGRAMS

PPD has shown keen interest in pursuing IPM programs in fields such as classical biological control of the cassava mealybug. This interest presents an excellent opportunity to develop research programs and design l/g and aw control strategies and tactics. This SEA suggests that such activities should be encouraged and extended to include other areas such as biological, agronomic, and cultural control methods.

The GTZ project aimed at strengthening the PPD which began in 1994 and planned to continue for ten years is positively biased towards the IPM strategies. PPD, in collaboration with relevant organizations, should educate farmers and extension agents in IPM techniques that will help minimize infestations via identifying, and elaborating appropriate alternative methods through applied research. Increased farmer involvement, particularly early in the development of l/g and aw, can prevent the need for increased pesticide use later. This is especially true for alternative control techniques, such as cultural control, habitat modification by inter-cropping in which, for instance, weeding of crops and margins of fields appears to be effective in reducing numbers and damage from certain species of grasshoppers.

ENVIRONMENTAL REGULATIONS

Tanzania does not have legislation that is fully empowered to execute environmental protection duties. The Department of Environment (DOE), which was created in 1990 to assume the responsibility for coordinating environmental activities is currently attempting to coordinate sectoral environmental regulations which could be developed to become the bases for the national environmental laws. National Environmental Action Plan (NEAP), the country's first step towards a comprehensive entity for the national planning and development, was completed in October of 1994. The action plan is part of the overall effort that GOT has

taken towards developing a national approach to environmental sustainability. This SEA believes that the DOE could greatly benefit from USAID support and provision of appropriate expertise to enable it develop and implement fully functional environmental regulations which will be adequately integrated with sustainable economic development objectives.

National Environmental Regulations should address protection of fragile habitats, including aquatic ecosystems -- estuarine, freshwater lakes, and riverines from pesticide applications. Protected areas should be surrounded by a pesticide-free buffer zone to avoid accidental pesticide contamination (e.g., spray drift). Normally, 2.0 km wide buffer zones are recommended for aerial spraying near protected area where wind-driven drift is likely. However, it may be more practical and reasonable to reduce the buffer zones to 500 meters wide or less under still-air conditions. Targeted ground-based application does not require large buffer zones. Under such circumstances, leaving 100 to 200 meters wide untreated areas may be adequate to warrant the level of desired protection.

The existing and to be formed environmental/pesticide regulations should be extended to include articles which formally restrict or forbid pesticide spraying for locusts, grasshoppers, or armyworm in fragile habitats and in national parks, game reserves, and protected areas in general, and such regulations should be fully enforced. A map showing distribution, breeding, and invasion areas of the principal locust, grasshopper, and armyworm species, other major insect pests, and graminivorous birds, in relation to the reserves and other areas to be protected in Tanzania, should be prepared and made available for use by the PPD, pesticide regulatory unit, the Ministry of Tourism, Natural Resources, and Environment's (MTNRE) Departments of Environment (DOE), Forestry (DOF), and Wildlife (DOW). This would be a very useful tool for decision-makers to direct control operations against l/g and aw as well as other emergency (migrant) pests.

PESTICIDE REGULATIONS, USE, AND MANAGEMENT PROCEDURES

Over the past few years, Tanzania's pesticide market has stagnated due to lack of funds on one side and as a result of the liberalization policy that has supposedly taken much of the capacity for pesticide importing away from the MOA and Crop Boards (Coffee, Cotton, and Cashew Boards). However, it is likely that the market will recover and continue to grow owing to the needs for these products and the active involvement of the private sector in agribusiness. The anticipated increase in the pesticide sector, no doubt, will call for an adequately rationalized pesticide legislation, regulations, management system, and infrastructure.

Tanzania established a parastatal, semi-autonomous type body, the Tropical Pesticide Research Institute (TPRI), through the 1979 TPRI Act. In 1984, the country's first-ever pesticides control

regulations were enacted. Although these regulations fall short of a full-fledged legislation, they are it is the only mechanism that controls importation, distribution and use of pesticides in the country. These regulation do not take into account the FAO Code of Conduct for Distribution and Use of Pesticides, as the latter was effected a year later than the former and the former have not been amended since. Nevertheless, the enactment has allowed for a pesticide registration scheme to be put in place with the power of monitoring and governing vested upon the TPRI, headquartered in Arusha. The regulations outline the requirements necessary for importation, classification, labelling, safety precautions, handling and usage of pesticides. To date, over 370 pesticide products have been registered for use in Tanzania (Appendix XII).

There is no doubt that both the 1979 Tropical Pesticide Research Institute Act and the 1984 Pesticides Control Regulations are encouraging steps taken to ensure safe handling and use of pesticides, however, there are a number of factors that have limited its enforcement and implementation. Among such constraints are lack of clearly defined legislation, shortage of inspectorate at the main ports of entry -- Dar es Salaam, Tanga, etc, and other posts that can carry out regular surveillance of smuggled products, as well as lack of sufficient trained manpower and necessary equipment.

The proposed core- and sub-functions of the PPD should be encouraged and supported to help draft well-defined and thorough pesticide legislation that will empower a named entity to effectively implement strict pesticide regulations. Once established, the unit should be strengthened, and an enforcement cadres be formed. The cadres should ensure full enforcement of national pesticide legislation and that only pesticides that are registered are imported and that such importations are done through the proper channels. This will greatly help curtail illegal importation of products and short-circuiting of established importation procedures for inappropriate or unneeded products that may reach Tanzania's pesticide market.

The MOA/PPD, Ministry of Health (MOH), and TPRI should collaborate on the delivery of training in the safe use of pesticides, including recognition of symptoms of pesticide poisonings and their treatments. The trainees should be able to handle field-related pesticide problems including recognition of symptoms of pesticide poisoning and administering first aid as appropriate. Such training programs would be effective if done during control campaigns in order to raise the level of awareness of the target audience and to guarantee proper surveillance before and after such operation.

Although considerable number of pesticides have been used in Tanzania against l/g and aw in the past, any pesticide proposed to be used in operations funded by the USG must be approved for use in the United States by the Environmental Protection Agency (EPA). Currently, nine pesticides are approved by the USAID for l/g control

many of which are widely used for aw control (e.g., carbaryl, chlorpyrifos, fenitrothion, lambda-cyhalothrin, and malathion) and/or are recommended for such use (e.g., acephate, bendiocarb, carbaryl, chlorpyrifos, diazinon, fenitrothion, lambda-cyhalothrin, malathion, and tralomethrin) making the PEA and USAID-approved lists relevant for aw control. In addition, existing local regulations governing the use of a particular pesticide, and instructions set forth on the label, must be strictly observed. In order to comply with Tanzania's pesticide regulation it is necessary to consult the list of pesticides registered for use in the country.

It is particularly important to note that five of the recommended, USAID-approved pesticides for grasshopper and locust control are Restricted Use pesticides in the U.S. This underlines the need for proper consultation with local authorities prior to making decisions as to whether or not they should be used. Also, only properly and fully trained applicators should handle these restricted use products.

Chlorinated hydrocarbons, such as dieldrin and lindane, are not acceptable for use under any circumstances, due to their environmental persistence, bio-accumulation, acute toxicity and broad spectrum target range. It should be noted that USG-funds cannot be used in any way whatsoever in connection with the use of these synthetic chemical pesticides. This includes funding any aspect of ground application or aircraft which spray chlorinated hydrocarbons, or the transport of such materials.

MANAGEMENT OF OBSOLETE PESTICIDES AND EMPTY CONTAINERS

Tanzania does not have appropriate facilities for disposal of obsolete and unusable pesticide stocks. As a result of this and other constraints, it is expected that considerable quantities of obsolete stocks of pesticides are accumulated in several places, including Zanzibar. It is also believed that owing to inadequate storage facilities leaking and rusting drums, damaged sacks, broken glass containers could be common occurrences. This SEA encourages that facilities, including warehouses and storage shades should be properly inspected by the MOA, MOH, and other appropriate experts (e.g., FAO) to meet the minimum standards and the existing storage facilities should be improved. Furthermore, proper disposal of obsolete pesticide stocks should be undertaken by using the best available technology suitable for the local situation, as determined by special assessment. Some of these products, particularly those that are stored in Zanzibar are currently being processed for proper disposal. This SEA commends the joint efforts of the AELGA Project and USAID/Tanzania in supporting a feasibility study on options for safe and appropriate disposal of obsolete pesticide stocks from the island of Zanzibar.

Empty pesticide containers normally should be triple-rinsed, punctured and/or crushed and buried. They should never be recycled unless reused for pesticide formulations under strict supervision

and only when appropriate facilities are available. The use in construction and for other purposes which involves high probability of human contact is strongly discouraged. As much as possible, container sizes should be compatible with reuse requirements. Making pesticides available in small containers (e.g., one liter size), increases the potential for subsequent use in cooking or storage of water, and should be minimized. Their use should be under strict supervision of the PPD, TPRI, NGO/PVO (if involved), and other appropriate bodies. In addition, the PPD should periodically inspect the pesticide formulation and reformulation plants to enforce proper handling and packaging procedures.

IMPACTS MONITORING & MITIGATION

Monitoring environmental impacts of pesticides, including adverse effects on non-target organisms, is a valuable means of detecting their possible misuse and of mitigating the potentially adverse impacts. Such activities should be integrated as part and parcel of any pesticide use program. The results of these monitoring activities could be used in the planning and implementation phases of l/g and aw control programs to minimize environmentally damaging operations.

Exposure to pesticides and the risk of unexpected acute chemical poisoning is most likely to occur with handlers, applicators, pilots, and pesticide formulation plant workers. Monitoring applicator exposure through cholinesterase levels has preventive value and such procedures are seldom practiced by the TPRI.

In areas of extensive pesticide use, environmental samples analyzed for residues would be a valuable basis for assessing exposure. In such areas, residue analysis should be carried out to determine the most appropriate means of pesticide delivery. These activities should be the collaborative work of TPRI, PPD, MOH-National Chemical Laboratory, and other capable institutions. The technical capacity and equipment needs in Tanzania to continue providing residue analyses could benefit from improvements to provide adequate services in residue analyses and other important analytical activities.

2.0 PURPOSE AND PROCEDURES

2.1 Background

In 1987, due to an outbreak of both grasshoppers and locusts in Africa, the Administrator of the U.S. Agency for International Development (USAID) declared an emergency waiver of the Agency's environmental procedures governing the provision of pesticides. The temporary waiver permitted USAID to provide assistance for procurement and use of pesticides for locust/grasshopper (l/g) control according to best available practices. However, with the waiver came a mandate to develop the Programmatic Environmental Assessment (PEA) for Locust and Grasshopper Control in Africa and Asia. This PEA was to provide the context for rational pesticide use, and to lay out measures to mitigate potential negative impacts. The PEA was completed in draft in 1988, and approved in May 1989.

The Administrator's waiver expired on August 15, 1989. Thereafter, all countries involved in l/g assistance operations were required to develop country-specific Supplemental environmental Assessment (SEA) in the context of the PEA. With the expiration of the Administrator's waiver, any future USAID assistance for procurement and use of pesticides had to fully comply with the Agency's Environmental Procedures. The PEA, and the country-specific SEAs, have served as the basis for satisfying these environmental procedures. The SEAs contain country-specific environmental information and provide guidance on environmentally sound management procedures for pesticide use in a particular country. In Africa, SEAs have already been put in place for Botswana, Burkina Faso, Cameroon, Chad, Eritrea, Ethiopia, the Gambia, Madagascar, Mauritania, Mali, Morocco, Mozambique, Niger, Senegal, Sudan, and Tunisia. An Organizational SEA was conducted on the Desert Locust Control Organization for Eastern Africa (DLCO/EA) to allow operations in Somalia. SEAs or their equivalents have also been developed for a number of countries in Asia, including Afghanistan, India, Jordan, Pakistan, and Yemen.

Tanzania is among the countries in Africa where chronic armyworm (aw) and red locust (rl), and occasionally the desert locust (dl), problems are often manifested. Certain parts of the country, are known to experience periodic and frequent outbreaks and infestations of l/g and aw. Most recently, in 1992, 1993, 1994, and 1995 rl and aw outbreaks affected large parts of the country. It is highly likely that such outbreaks will continue to occur, calling for appropriate interventions. Furthermore, periodic requests for technical assistance, equipment, pesticides, and application services are likely to continue.

Because of occasional invasions and outbreaks of l/g and aw, and their potential impact upon food security, more attention should be given to these pests. Tanzania is a member of two regional organizations that deal with l/g and/or aw problems -- DLCO/EA and

IRLCO/CSA. Despite the fact that l/g and aw are part of the agro-ecology of Tanzania and occasionally cause substantial damage to agricultural crops, currently the country possesses limited capacity to monitor and regulate their activities and to carry out control operations. Much of the capacity available in terms of human resources and commodities is often geared towards protecting cash crops. For instance, it is estimated that more than 85% of the pesticides consumed in Tanzania go into cash crops protection -- coffee and cotton. This puts much of the food crops under serious threat from pests, including l/g and aw. Given the current conditions in Tanzania, it is likely that USAID will receive requests for l/g and aw control, and it is possible that these requests will include pesticide use.

Therefore, USAID and the GOT should take the initiatives to assess the conditions under which these commodities and services will most likely be used and should search for alternative control options in line with the principles integrated pest management (IPM). Based on these investigations, alternative means should be devised that will ensure human and environmental safety. This becomes especially important in sensitive and fragile ecosystems and human settlement areas. Moreover, the goal of any short- and medium-term U.S.-funded assistance for l/g and aw management should focus on ensuring food self-sufficiency and sustainability in the country, focusing on small holdings and family farms. In the event provision assistance that involves pesticides is contemplated by USAID/Tanzania or USAID/W for l/g and aw control, this SEA in combination with the PEA fulfill the requirements of USAID Environmental and Pesticide Procedures.

2.2 Drafting Procedure

USAID Environmental Procedures (22 CFR 216.3(a)(4)), describes the process to be used in preparing an Environmental Assessment. The rationale and approach for the country-specific SEA are outlined in cables State 258416 (8/12/89) and State 275775 (8/28/89).

This SEA was developed through a visit to Tanzania in June of 1995 by Dr. Yeneneh T. Belayneh, Ecotoxicologist, Assistant Technical Advisor to the AELGA Project, resident in AFR/AA/DRC, with logistical support from USAID/Tanzania.

Field trips and site visits were made to Morogoro and Arusha regions. The author took a road trip to Arusha, some 700 km northwest of Dar es Salaam, to make a visual observation of the armyworm/grasshopper habitat and to meet with TPRI, regional, district Plant Protection staff, researchers, and others and obtain first hand information on l/g and aw problems and operations, pesticide use, and the national capacity for the operations.

2.3. Related Assessments

The overarching previous assessment concerning l/g control operations and the primary supportive document is the PEA for L/G Control (TAMS/CICP, 1989). The PEA adequately covers l/g operations in Africa and Asia. It also provides guidelines for rational pesticide use and identifies and lays out measures to mitigate potential negative impacts associated with l/g control options. However, the PEA does not address aw. In recognition of this gap and owing to the importance of aw in sub-Saharan Africa which often leads to constant need for technical assistance and other forms of support, and the inclusion of other emergency pests as part of the mandates of the AELGA Project, a memorandum was issued (August 9, 1994) by the Africa Bureau Environmental Officer and cleared by appropriate offices and the General Council (GC) to amend the existing SEAs for l/g to include aw (Appendix II). Based on the recommendations of subject memorandum, L/G SEAs for Ethiopia and Eritrea were amended to include aw control. This precedence was fully utilized in the process of developing the L/G and AW SEA for Tanzania, in which it was considered logical, time saving, and economical to develop an SEA for l/g and aw in stead of developing a separate SEA for l/g and amending it later to include aw.

This L/G and AW SEA for Tanzania complements the 1989 PEA for Locust and Grasshopper. It provides specific information on the country profile and agro-ecological regions (zones) as related to the locust/grasshopper and armyworm (l/g and aw) problems and control options in Tanzania. It furnishes information on program operations and options regarding l/g and aw control interventions, and identifies foreseeable significant effects such operations may have on the environment and on target populations.

SEAs complement the PEA and deal with country-specific environmental issues not addressed in the PEA. SEA should be considered an integral part of it.

Other assessments and/or documents pertinent to the l/g and aw control and pesticide management include:

(1) Review of Environmental Concerns in USAID Programs for Locust and Grasshopper Control (U.S. Agency for International Development, Washington, D.C., September 1991);

(2) Final Report on the Handling of Pesticide in Anglophone West Africa. (Youdeowei, 1989 FAO Conference report, Accra, Ghana);

(3) Final Report on Pesticide Management in Francophone West Africa. (Alomenu, 1989 Report on the FAO Conference at Accra, Ghana);

(4) Supplemental Environmental Assessments for Botswana, Burkina Faso, Cameroon, Chad, Ethiopia, Eritrea, The Gambia, Kenya,

Mali, Madagascar, Mozambique, Niger, Senegal, Somalia, Sudan, Algeria, Morocco, Tunisia, India, Pakistan, Afghanistan, and Yemen.

(5) The Africa Emergency Locust/Grasshopper Assistance Midterm Evaluation (with specific-country case studies for Chad, Mali, Niger, Mauritania, and Cape Verde) (Appleby, Settle & Showler, 1989).

(6) Pesticide User's Guide: A Handbook for African Extension Workers. (Overholt and Castleton, 1989, USAID/AFR/TR/ANR/AELGA, Washington, DC).

(7) Pest Management Guidelines of the Agency for International Development. (Overholt, Showler, Waite, and Larew, 1991, USAID, Washington, D.C.).

(8) Locust/Grasshopper Management: Operations Handbook. (USAID, 1989, Washington, D.C.).

(9) Assessment of the Africa Emergency Locust/Grasshopper Assistance (AELGA) Project. (Schroeder, 1993).

(10) Proceedings of the USAID West African Regional Conference on Pesticide Disposal: Disposal of Pesticide Containers and Obsolete Pesticides; Niamey, Niger, eds. Knausenberger, Andreason, and Belayneh, 1990.

(11) Grasshoppers and Locusts: the Plague of the Sahel, PANOS Dossier, The PANOS Institute, London, 1993.

(12) Evaluation of USAID-funded Grasshopper/Locust Biological Control Research Projects in Africa, Washington, D.C., Belayneh et al., 1995.

2.4 Analysis and Document Preparation

The above documents have been used in the preparation of this SEA and are often relied upon without citation. Some internal USAID/Tanzania data are also used without citation. Other relevant documents are cited in the text when supportive data is used.

Various documents which deal with the l/g and aw situation vis-a-vis environment, ecology, control, and biodiversity of Tanzania that were consulted in the preparation of the SEA include PPD annual reports, FAO, GTZ, National Environmental Management Plan for the Environmental Support Project; Tanzania - the current environmental situation. Most of these documents are fully cited in the reference section. Additional documents that can be referred to are listed in Appendix III.

3.0 ENVIRONMENTAL REGULATIONS

3.1 USAID Environmental Procedures

It is USAID policy to ensure that any negative environmental consequences of an USAID-financed activity should be identified and mitigated to the fullest extent possible prior to a final funding and implementation decision. This document covers specific environmental consequences involved with synthetic chemical pesticide use, and necessary safeguards and mitigation for any future control programs. Pesticide related activities will, therefore, be addressed in line with USAID's Environmental Regulations and Procedures. In addition, alternatives to the synthetic chemical pesticide are highly recommended when found to be appropriate, and can be part of an IPM program.

According to *Pest Management Guidelines of the Agency for International Development* (1991):

"USAID's regulations require that the potential environmental consequences of USAID-financed activities are identified and considered by USAID and the host country prior to the final decision to proceed with an activity. The procedures that guide this regulation are set forth in 22 CFR Part 216. Section 117(c) of the Foreign Assistance Act and Section 533(g) of the 1991 Appropriation Act require that USAID review its projects, programs, and activities in accordance with requirements of 22 CFR Part 216. USAID's policy is to approve for procurement or use only those pesticides that are critically needed and proven safe."

U.S. pesticide contributions are regulated by U.S. pesticide laws and procedures (as described in the PEA). Only those pesticides listed in Appendix IV can be procured using U.S. funds and can only be used in conjunction with other forms of U.S. assistance for l/g control (e.g., aircraft). In addition to other products that have been registered by the USEPA and TPRI for such uses and those that are recommended by the FAO, those pesticides listed under Appendix IV can also be used for aw control. In a U.S.-funded operation, pesticides are to be used according to label instructions only. Used pesticide containers and any unwanted pesticide resulting from a U.S.-funded operation must be disposed of properly and safely. No U.S. funds shall be used to purchase, transport, or apply any pesticide that has been banned in the U.S. This includes the chlorinated hydrocarbons such as dieldrin, DDT, lindane, and benzene hexachloride (BHC).

3.2. Tanzania's Environmental Regulations

Tanzania's DOE was formed in 1990 by a Presidential Decree as part of the Ministry of Tourism, Natural Resources, and Environment (MTNRE). The Department is charged with the responsibility for

developing appropriate environmental policies and coordinating the existing relevant sectoral environmental policies. The DOE is the ultimate enforcer of environmental policies, regulations, and produces. To date, the Department has put in place the National Environmental Action Plan in June of 1994. The Department expects to finalize National Environmental Policy is late this year with the support of Norwegian Agency for International Development (NORAD). Given the progress made towards achieving the ultimate goal and owing to the dire need for support, GOT could benefit from USAID's provision of appropriate expertise and capacity-building measures to enable the DOE fully develop and implement functional environmental regulations which will adequately integrate sustainable economic development.

3.2.1. Other Environmental Regulations in Tanzania.

In addition to the National Environmental Action Plan that focuses on coordination of national environmental issues, Tanzania also has legislation that regulates the country's rich biological diversity including wildlife. Under this legislation, the country allows five categories of protected areas (PA): national parks (NP), game reserves (GR), conservation area (CA), game controlled areas (GCA), and partial game reserves (PGR) while forest reserves (FR) falls under the jurisdiction of the forest legislation. Each of the PAs has different conservation purposes and hence allows different forms of use. NPs, GRs, and FRs exclude human settlement within them. Fragile habitats including aquatic environment are protected by law to be free from pesticide related activities. The MTNRE has the mandates for designating areas susceptible to pesticide applications. Protected species are covered by a series of guidelines which control gathering, hunting, and fishing.

4.0 COUNTRY PROFILE, SITUATION, AND PROBLEM DESCRIPTION

4.1. Physical Location, Climate, Soils, and Vegetation

Tanzania is situated just south of the equator between Burundi, Rwanda, and Zaire to the west, Zambia, Malawi, and Mozambique to the south, Kenya and Uganda to the north and the Indian Ocean to the east (Figure 1). The country has a total land area of 945,000 square kilometers, including approximately 60,000 square kilometers of inland water. With the exception of the narrow strip along the 900 kilometers coastal area, most of the country is more than 200 meters above sea level and much of the country is located on the Central African Plateau.

Tanzania's distinct topographic features include the highest and lowest parts of Africa (Mt. Kilimanjaro at 5,895 m and Lake Tanganyika at 358 m below sea level). The Great Rift Valley, which is often marked by long, narrow and deep depressions, often filled with lakes, is another main topographic feature of the country.

Climate:

The major climatic factors that affect the agro-ecological zones and associated activities and subsequently pest population dynamics include rainfall, temperature, humidity, and wind speed.

Tanzania's climate is characterized by the long dry spell from May to October and a period of low rainfall from November through April and a few days/weeks of heavy downpours. The beginning of the rainy season varies from region to region. For example, along the coast, the rainy season is between March and May as well as October and December. These areas receive about 1,500 mm of rain per annum and the temperature is between 20 - 30 degrees centigrade. The highlands in central part of the country are generally dry and receive 500 to 850 mm of rain and have a temperature of 10 - 35 degrees centigrade. Over 50% of the country receives less than 750 mm of rain per year (the minimum required for viable non-irrigated cultivation for the country).

Soil and vegetation:

Owing to the diverse topography, Tanzania has an enormous variation in its soil patterns and vegetation; the most fertile soils in the country are volcanic soils (Figure 2). Vegetation varies from tropical rainforest, woodland and bushland savanna to semi-arid and short-grass savanna (Figure 3).

Tanzania's forest and woodland areas are estimated at 44 million hectares (ha), covering about half of the total land area of the country. The forestry sector accounts for about 10% of total foreign exchange earnings and over 90% of the fuel used in the rural and urban areas.

4.2. Agro-Ecological Zones, Agricultural Resources, and Population

Tanzania's major agro-ecological zones are pretty much determined by its unique location on the continent, the topography, climatic factors, the coastal zones, and inland bodies of water such as Lake Victoria and Lake Tanganyika.

Tanzania is predominantly an agrarian country. Agriculture, forestry, and wildlife are the backbone of the country's economy. These sectors alone contribute more than 80% of the livelihood of the population.

The major agronomic food crops of Tanzania include maize, rice, sorghum, millets, wheat, cassava, peanuts, fruits, and vegetables, among others. Industrial and export crops include coffee, cotton, cashew nut, tea, pyrethrum, sisal, oranges, pineapples, and tobacco (Appendix V). Cassava and cashew are mainly grown by family farmers and are widely used as food sources.

Agricultural practices in Tanzania are diverse with considerable amount of land being irrigated or having the potential for irrigation schemes in many parts of the country (Appendix VI). Such schemes often require large quantities of agrochemical inputs including pesticides which are used for the control of various types of pests including such as locusts, armyworm, and occasionally grasshoppers. The major users of pesticides are coffee and cotton.

Cattle and small ruminants are the most common livestock in Tanzania. In 1992 cattle population was estimated at 13,230,000 heads of cattle, of which 12,871,000 were indigenous. Of the 13.23 million cattle (throughout the country), 237,300 were dairy cattle (mainly in Kilimanjaro, Arusha, Tanga, Iringa, Kagera, Mbeya, and Morogoro), 121,600 beef (predominantly in Arusha, Dodoma, Kagiera, Morogoro, and Tanga), 3,555,800 were sheep (from Arusha, Shinyanga, Singida, Mwanza, Mara, Kilimanjaro, Tabora, Tanga, and Dodoma), and 9,109,000 were goats (from Arusha and Shinyanga) (Appendix VII).

Tanzania is considered a sparsely populated country, with some 26.6 inhabitants (with an average of 27.2 persons/sq.km.) and an annual growth rate of 3.4%. Based on information obtained from the MOA's Statistics Unit, Planning and Marketing Division (May 1993), population density among the different regions varies from 10/inhabitants/sq. km. in Rukwa and Lindi to 94 and 97 for Mwanza and Kilimanjaro regions with Dar es Salaam being the most densely populated at 1,849 inhabitants/sq. km. (Appendix VIII). Of the estimated 26.6 million inhabitants about 60% are under 25 years. Over 80% of the population reside in rural areas and derive their livelihood from agricultural activities including, crops, livestock, forestry, fishing, and hunting. The agricultural sector accounts for 48% of the GDP.

4.3. Locust/Grasshopper and Armyworm Species and Activities in Tanzania

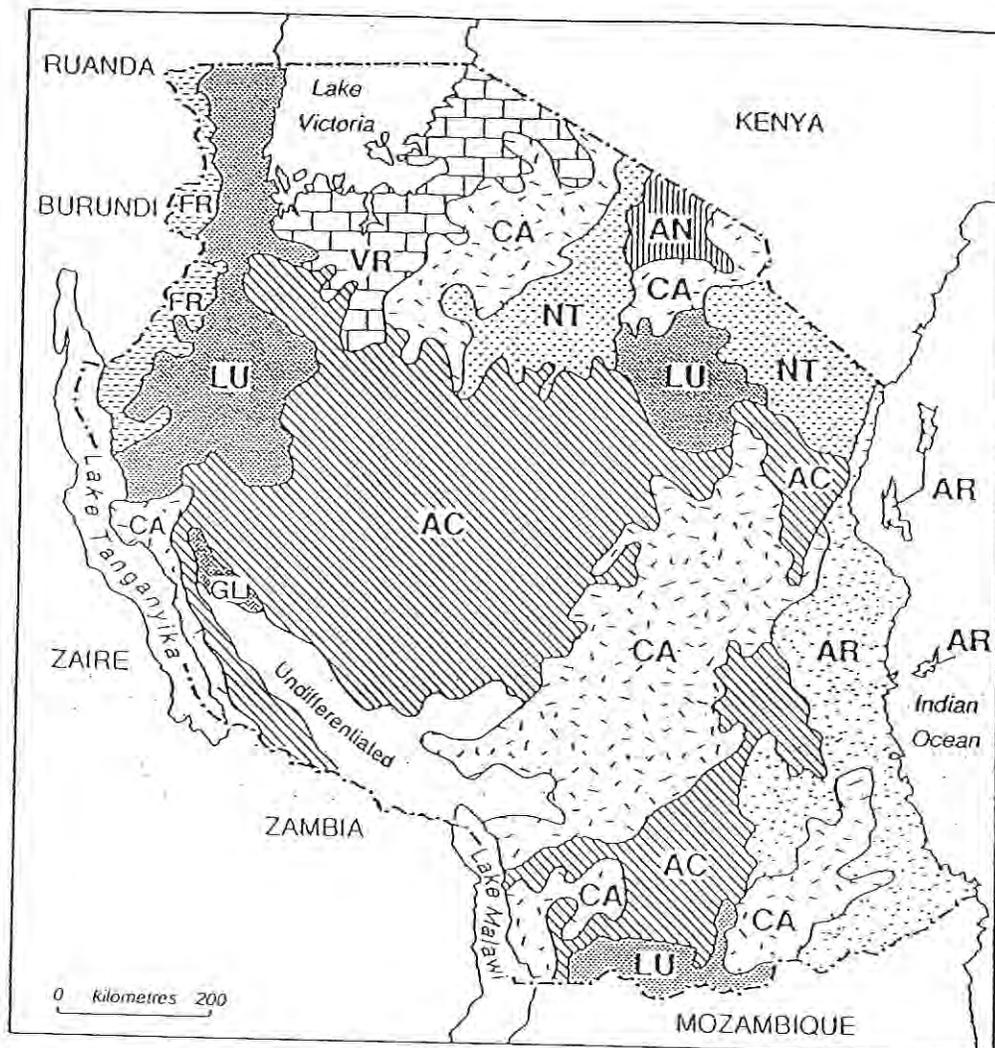
Tanzania is currently dependent on subsistence farming system not self-sufficient in agricultural production. Therefore, any factor, such as drought or blight, is considered a major economic and social threat. Any additional loss from l/g and aw damage both in terms of food crops as well as pasture could only aggravate the current situation in the country.

A number of locust, grasshopper, and armyworm species of economic importance are known to be found in several localities almost through out the country.

The most common locust, grasshopper, and armyworm species in Tanzania include the:

1. Red Locust (rl), *Nomadacris septemfasciata*,
2. African Migratory Locust (aml) --
Locusta migratoria migratorioides

Figure 2. Soil Map of Tanzania

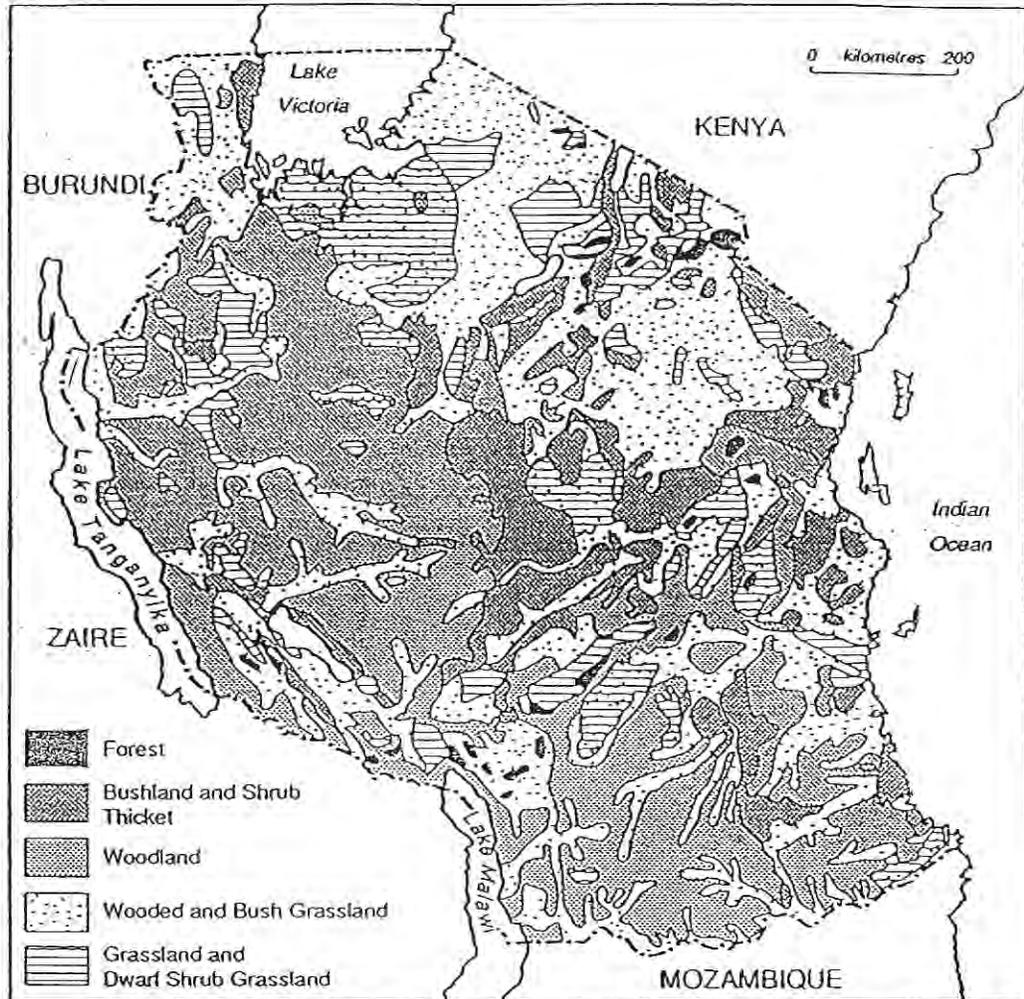


Legend

- AC** Acrisols: Soils with an argillic B horizon (containing illuvial clay and clay skins) with base saturation < 50%
- AN** Andosols: Soils developed from recent volcanic materials
- AR** Arenosols: Very sandy soils which have an identifiable B horizon; clay < 15%
- CA** Cambisols: Soils with a 'structural B horizon' but no argillic horizon
- FR** Ferrasols: Soils with an oxic horizon with a CEC < 16 m.e./100 g clay
- GL** Gleysols: Gleyed soils with hydromorphic properties dominating
- LU** Luvisols: Soils with an argillic B horizon with base saturation > 50%
- NT** Nitosols: Soils with a deep argillic B horizon and merging horizon boundaries, strongly structured with shiny ped faces
- VR** Vertisols: Dark cracking clay

Source: Adapted from FAO-Unesco Soil Map of the World, 1977

Figure 3. Vegetation map of Tanzania.



Source: Adapted from Handbook of Natural Resources of East Africa, 1:4.0 million map of E. Africa, E. African Literature Bureau, Nairobi, 1976

3. the Desert Locust (dl), *Schistocerca gregaria*
4. Tree Locusts (tl), *Anacridium spp.*
5. the edible green grasshopper, *Homorocoryphus spp.*
6. Senegalese grasshopper, *Oedaleus senegalensis*
7. variegated grasshopper, *Zonocerus varigatus*
8. African Armyworm (aw), *Spodoptera exempta*

4.3.1. Locust/Grasshopper Species of Economic Importance in Tanzania

Tanzania falls within the southern portion of the Desert Locust (dl) invasion zone (Figure 4). Two other plague species of locusts that are known to invade or breed in Tanzania are: the African Migratory Locust (aml) (Figure 5), and the Red Locusts (rl) (Figure 6). While the aml does not breed in Tanzania, the rl is known to breed in isolated, rather restricted areas of Iku and Katavi plains, in the Rukwa Valley, Rukwa region, southwestern part of the country. Here rl is always present and never solitary. The Malagarasi River Basin, Kigoma/Tabora regions (central part of the country) and Wembere steppes (plains), Tabora region, in the central part of the country are also known to be among the major breeding and outbreak areas for the rl (Table 1).

Tanzania is also within the distribution zones of the tl, and the Senegalese grasshopper, *O. senegalensis*. These locust and grasshopper species are often found attacking a wide variety of graminaceous crops, including rice, maize, mallots, and sorghum, and are considered important agricultural and pasture land pests in Tanzania.

The rl are considered the most important of the locust species that are known to be found in Tanzania almost annually. This species often occurs in large numbers and requires extensive control operations (Table 2) and if left uncontrolled, can cause substantial damage to a number of crops.

The aml has both a solitary and gregarious phase. During unfavorable environmental conditions, the locust will be in the solitary phase, with small populations residing in isolated locations. During this phase, the locust does not cause noticeable damage on major food crops, as it feeds primarily on grasses. This seems to be the phase at which aml most commonly occurs under Tanzania's agro-climatic conditions.

Table 1. Major red locust breeding and outbreak areas, locust operation bases, and associated airstrips in Tanzania.

Locality	Size (km ²)	Operational Base	Airstrip status	Alternative Airstrip proximity (km)
<u>WEMBERE</u> Serengeti Susilanda Muhama Muswaki Mudalagwigwe Loya	2000	Massage	serviceable	Nzega (50) Tabora (70)
<u>MALAGARASI</u> Batusi Fuswa Ibolero Kabanga Mangati Mbulu Ntende Nzioma Udehula Ugacca	15,000+	Kabanga	unserviceable	Kaliua (30) Urambo (75)
<u>RUKWA</u> South Rukwa Central Rukwa North Rukwa Isimba Katisunga Iku Katavi	14,400+	Kafukola " Muze " Mwesi " "	unserviceable " serviceable " unserviceable " "	Muze (20) Sumbawanga (40) " " (60) Mpanda (85) " (80) " (50)

Figure 4. Distribution of the Desert Locust, *Schistocerca gregaria*.

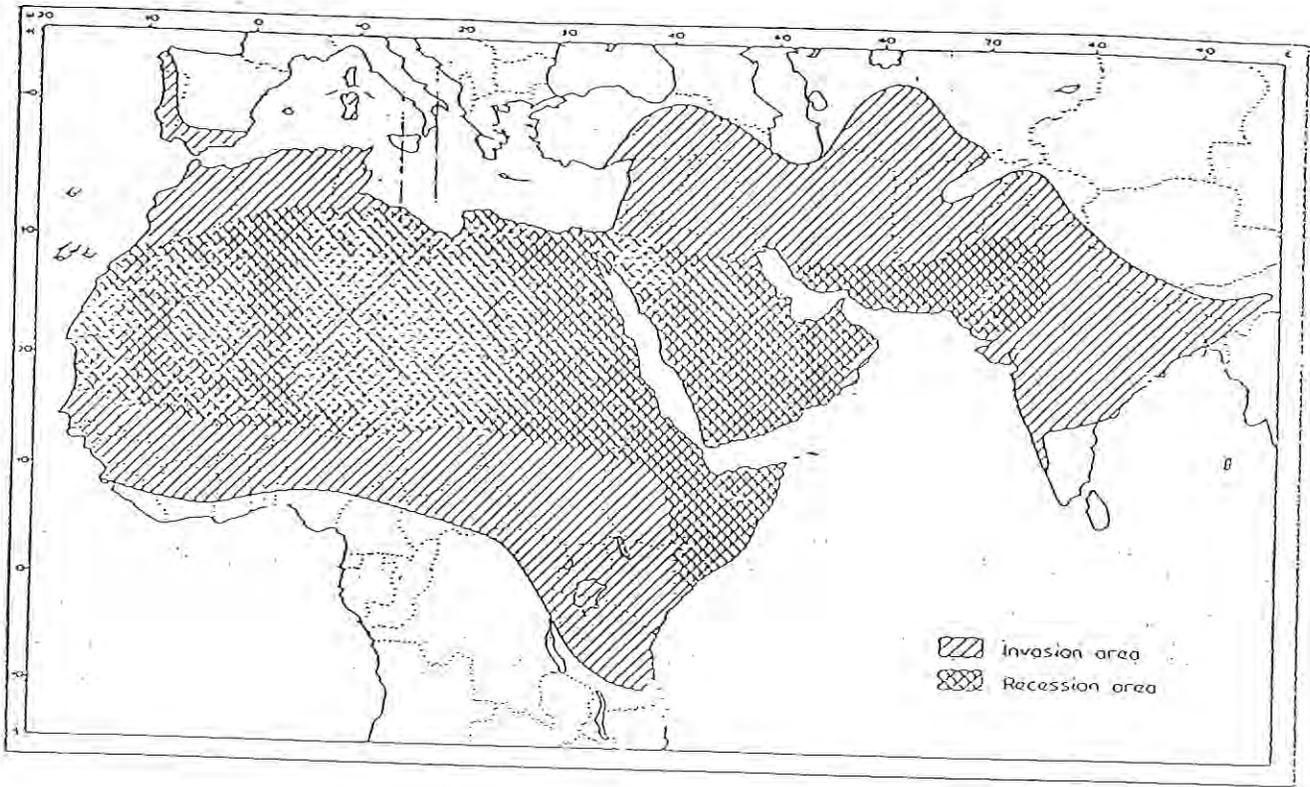


Figure 5. Distribution of the African Migratory Locust, *Locusta migratoria migratorioides*.

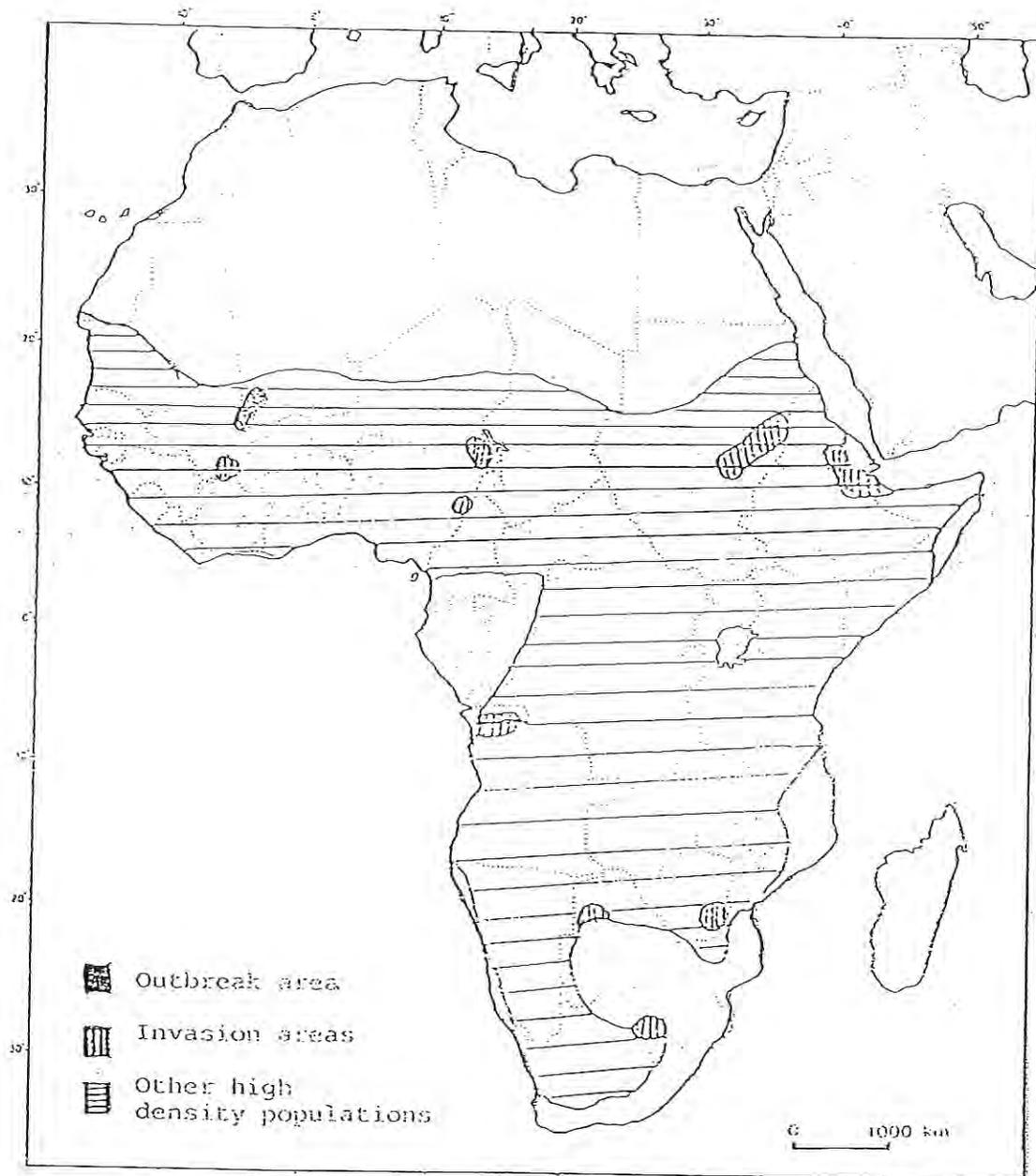


Table 2. 1994 and 1995 red locust control campaigns in Tanzania, outbreak regions, number of hopper/swarms treated, areas sprayed (ha), and quantity (lt) and types of pesticides used.

	Wembera	outbreak area Malagarasi	Iku	total
1994				
swarms	14	1	2	17
*hoppers	-	-	-	-
area treated	2654	200	400	3254
chlorpyrifos	1137	-	-	1137
fenitrothion	430	100	200	730
1995				
swarms	-	65	18	83
hoppers	58	-	-	58
area treated	3110	2885	450	6445
fenitrothion	1560	1435	200	3195

(Source: Modified from PPD-MPCU, Dar, Tanzania)

*hoppers escaped treatment in 1994 due to MPCU's inability to pull resources together for an early campaign (personal communication with Mr. R.S.K. Chomba, MPCU)

With the change in climatic conditions, temperature and rainfall becoming favorable, weeds and other grasses become abundant, leading to a sudden increase in the number of locust populations, causing a phase change from solitary to gregarious. The gregarious populations move together, allowing increased opportunity for reproductive activities, and causing major crop damage when a swarm moves into an agricultural area.

This species can potentially have four generations per year; one during the dry season, and three during the wet season. Population numbers will remain fairly stable during the dry season generation, but will fluctuate either positively or negatively during the wet season. With favorable environmental and breeding conditions, significant population increases can occur with each succeeding generation during the wet season. When gregarized, population numbers can increase so rapidly that immediate control operations are required. In addition to the locust attacks, the country often suffers from invasion by a large number of grasshopper species including OES.

Figure 6. Principal breeding areas of the red locust, *Nomadacris septemfasciata* in Tanzania.

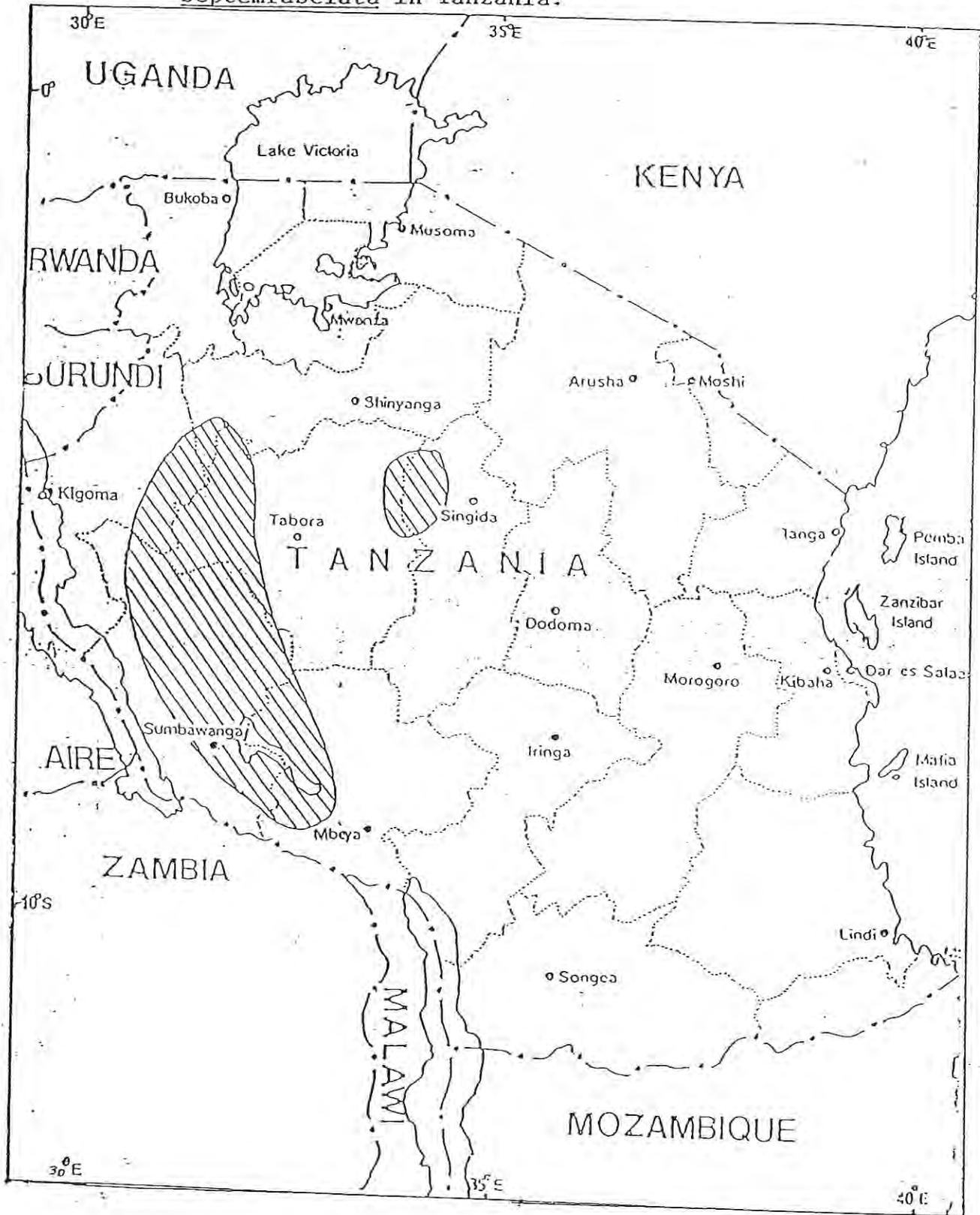


Figure 7a. Areas infested by red locust swarms and sprayed in August of 1994.

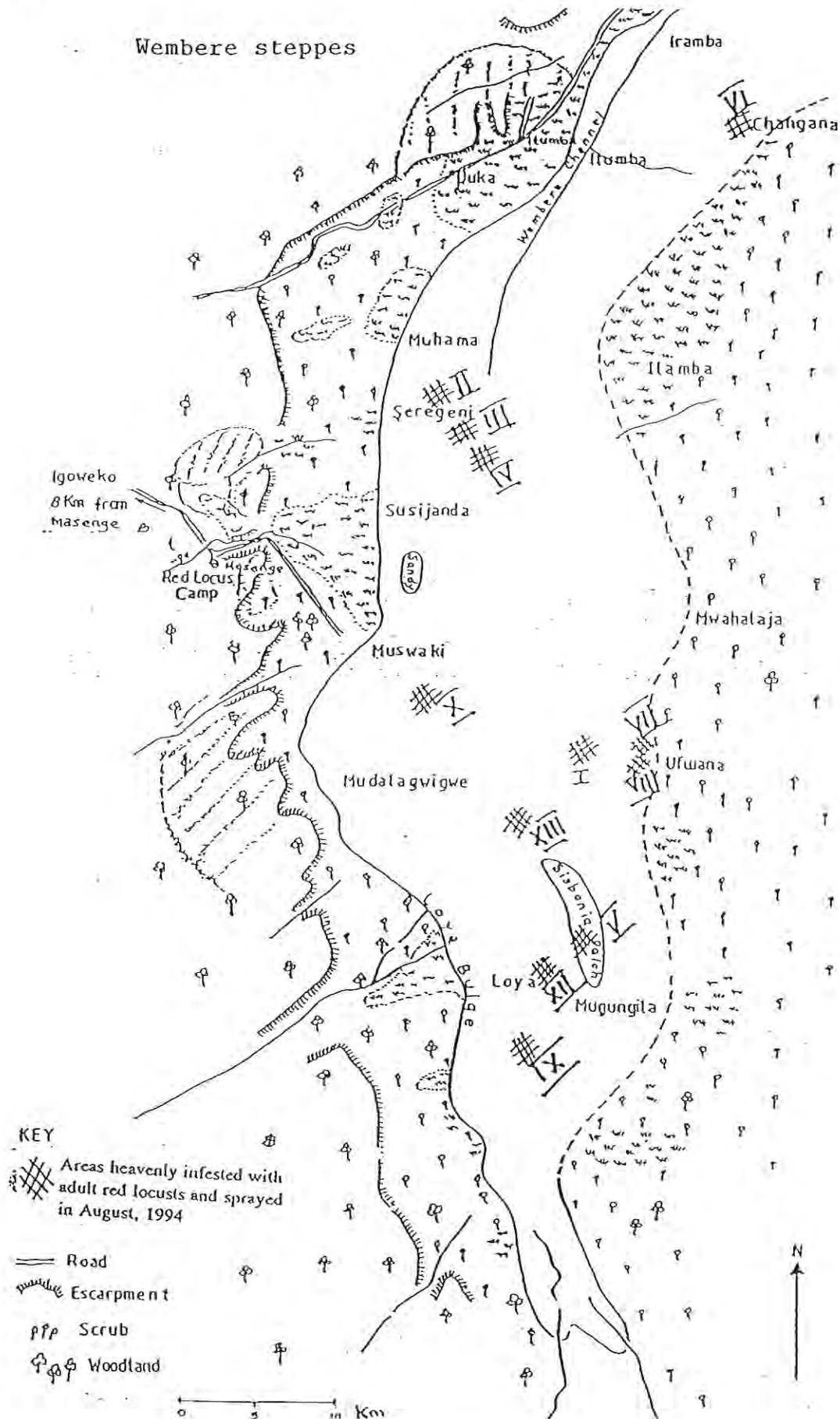
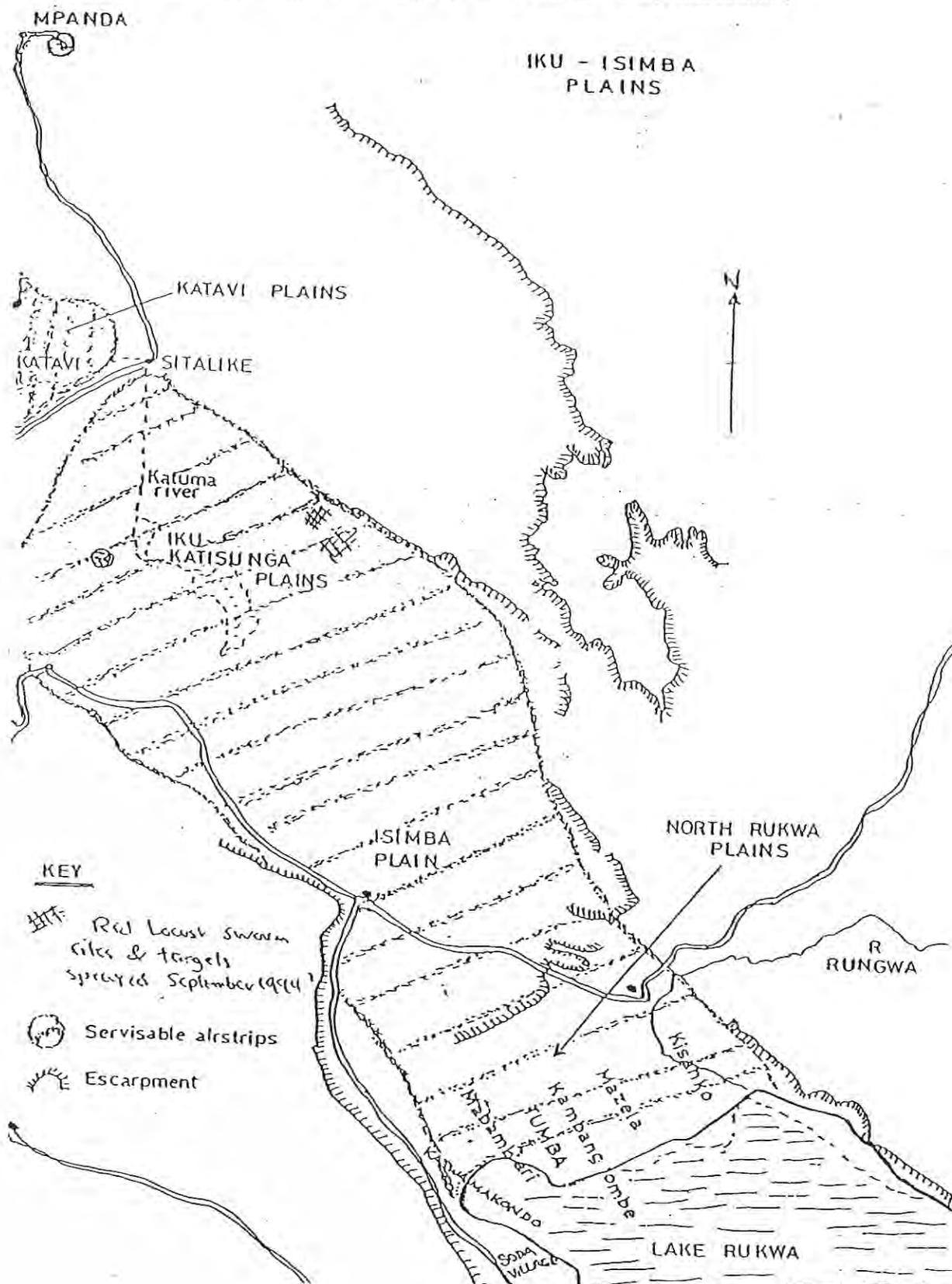


Figure 7b. Areas infested by red locust swarms and sprayed in September of 1994.

Iku and Isimba Plains (Part of lake Rukwa Valley Grasslands)



Tanzania's physico-climatic conditions, including rainfall, temperature, and vegetation often create conducive conditions for l/g and aw outbreaks. Such outbreaks are compounded when productivity is lowered by other factors such as drought, plant disease or other pest damage. Tanzania will probably continue to experience future problems from the dl, rl, aml, as well as grasshopper and armyworm infestations. While the level at which such problems occur is difficult to predict, especially given the seasonal migrations and dispersions in the region, major outbreaks can be prevented by vigorous survey and early treatment and proactive programs.

Despite the fluctuations in the level of locust and grasshopper infestations, active coordination is essential between PPD, FAO, USAID, other donors, the regional organizations responsible for l/g and aw control, i.e., DLCO/EA, and IRLCO/CSA, and other potential participating organizations. Support for strengthening MPCU capacity involving training, control operations, management planning, survey, forecasting, and early season intervention should be emphasized. As a long-term strategy, less emphasis should be placed on late season emergency operations which may involve large-scale aerial pesticide spraying. Because early season preventive operations can prevent late season emergency operations which will likely involve significant amounts of pesticides, preventive approach is more environmental friendly and less expensive in terms of operational costs.

4.3.2. Locust/Grasshopper Management Overview

The Migrant Pest Control Unit (MPCU), upon which the responsibility for l/g and aw operations is vested, is one of the 4 units of the PPD of the MOA. The MPCU is supposedly responsible for all migrant pests, including locusts, grasshoppers, armyworm, Quelea, and rodent, particularly when l/a and aw escape the DLCO/EA and the IRLCO/CSA primary zones. MPCU, with a limited capacity handles any such problems should they occur on a large scale.

Over the past few years, the MPCU and the PPD have been benefitting from support through a project by the German Agency for Technical Cooperation (GTZ) and supports from the EEC, CIDA, UNDP, and FAO. Although these Agencies have provided appreciable assistance and services to the national pest management operations, they are only beginning to have substantial impacts on the status of indigenous institutional capacity.

In response to the 1986-89 l/g outbreaks that affected over 23 countries in three geographical regions, USAID's direct intervention against these pests in Africa was largely in the emergency control of swarms, with some preparedness (e.g., research into alternative control technologies) and capacity building activities. This approach carries excessive costs and has limited overall impact. Furthermore, such intervention is environmentally costly because of

the enormous quantities of pesticides that are sometimes used. Since the last locust plague, USAID's has been promoting and encouraging proactive and preventive approach. To this effect, USAID has been engaged in developing and strengthening national capacity through training, research, and institutional bridling with the ultimate goal of ensuring sustainability and self-sufficiency. This approach relies heavily on good survey, immediate and targeted intervention, and control actions that are aimed at hopper bands rather than against flying swarms and focuses on good forecasting and monitoring tactic for aw. In addition, alternative methods to chemical pesticides, including biological control and habitat modification, should be attempted whenever possible.

The nature of l/g population dynamics makes preventive actions in breeding areas desirable. Maintaining populations in a recession through the use of IPM tactics and minimal application of pesticides should be the strategy of choice. The historically primary breeding/outbreak regions of Malagarasi, Wembera, and Rukwa must be surveyed on a regular basis, with spot treatment operations conducted as required to keep populations in the solitary phase.

L/G infestations are not easy to predict in advance. Rainfall distribution and subsequent vegetation that follows seem to be the best single predictor, but locusts and grasshoppers often occur in patterns not obviously related to any easily measured factors. Because of this, surveillance is essential for the design of tactics to maintain low locust and grasshopper populations and to prevent outbreaks. Because rainfall and the vegetation that follows it is important, satellite derived greenness maps may be utilized as additional guidance to strengthen visual surveillance.

Field survey is essential in any l/g management program and must be given high priority by both the recipient country and donors. Included in the survey program must be a sound knowledge of the pest's biology, and an understanding of the relationship of environmental conditions with the pest's population dynamics.

For organizational purposes, FAO should be considered the official donor coordinator for l/g as well as aw control activities on behalf of the GOT and FAO should be supported in continuing that role. In addition, the MPCU should be encouraged to work closely with the FAO, DLCO/EA, IRLCO/CSA, and other donors to insure that repetition of unneeded material or pesticide donations and excess stock build-up does not occur.

L/G vary over a wide range of population levels in their natural habitat, depending upon rainfall and other climatic and environmental conditions. A migrating infestation of l/g depending upon wind conditions and movement patterns, can have a significant impact on agriculture, because crop infestation levels depending upon the numeric density and life stage of the insect. Although major outbreaks are sporadic and will fluctuate greatly over periods of five to ten years, if not longer, limited l/g populations do

occur almost every year to some degree in various locations. Armyworm, on the other hand, is an annual pest that outbreaks virtually every year causing considerable damage.

For l/g management purposes, potential impact on ultimate crop yield can be classified according to levels of infestation. These levels are quantified in relation to the intervention threshold level. The intervention threshold (also called economic threshold) is very specific to the crop, life stage of crop, insect species, and insect life stage.

Ideally, PPD should maintain ongoing insect management programs during periods of non-outbreak pest levels. Such programs should include efforts to reduce human health risk, protect environmentally sensitive habitats, and minimize pesticide use through cultural, biological and traditional means of control. In deciding assistance to the PPD for l/g management activities, USAID will examine both the pest situation and the capabilities of the PPD as well as other potential participant in the control operations. Decisions will be made in such a way as to minimize the amount of pesticide used. The USAID participation in a l/g as well as aw management program should be depend on the severity of the problem, as well as the extent to which such assistance will make the PPD more sustainable. The actual level of intervention should be determined by l/g density, crop conditions, PPD capacity, environmental conditions, and the potential for a major outbreak.

If a situation calling for USAID-assisted intervention occurs, an Action Plan should be developed that will clearly outline the nature and extent of activities to be launched. Further, all possible safeguards must be implemented in order to protect humans, non-target organisms, crops and the environment at large.

Prior to U.S.-funded assistance, a thorough analysis of needs is necessary. In evaluating areas of assistance, USAID/Tanzania, in order to be responsive to the requests of the GOT and NGOs/PVOs, must further ascertain what materials and capacity the PPD and the Regional organizations such as the DLCO/EA and IRLCO/CSA already have, and what other donor supported programs are planned or implemented. Supplying the PPD with pesticides and materials in excess of objective need will not assist in managing l/g. Preferably, USAID/Tanzania should verify the existence of the problem, possibly through an independent assessment with the assistance from USAID/Washington (and expertise of the AELGA project) and/or REDSO/ESA.

However, despite the fact that PPD and TPRI may do their level best to ensure safety during a large-scale pesticide application operation, the rate of accidents, overuse of pesticides and use of incorrect formulations are likely to increase, because of the increased pesticide use and the pressure of panic treatments. The most important function of the GOT under these conditions is to institute greater local control (for example, use of contact

farmers), communicate effectively with the affected population, to describe the necessity of the emergency measures, and to ensure to the extent possible the safety of the population and the environment. Operations at a local level, accompanied by appropriate training in pesticide use and safety, is greatly preferred to massive treatments by large aircraft.

The position of USAID on pesticide application should be to support the judicious use of such chemicals for the control of economically important pests. The first line of defense must be field survey work to monitor the population level of a particular pest and the potential injury that it will cause. Proper monitoring will generally allow sufficient time to plan a strategy of control. Survey operations will also alert officials should pests be breeding at a faster rate than expected, or if a significant migration has occurred. The first line of defense is spot treatment by ground application methods. This involves manpower-intensive measures to directly attack the sites of the infestation at its early stages. Aerial application is considered a last resort. This control measure is used when all others have proved ineffective or the magnitude of the threat exceeds the indigenous PPD capacity for ground control.

Since vigorous survey and early season management can save both valuable funds and resources, and is considered to be far more environmentally sound than late-season emergency operations, it is recommended that the GOT more adequately support PPD survey operations. However, the reality is that additional donor assistance will likely be required to ensure a reasonable level of survey and management capacity within the PPD. With regard to U.S.-funded assistance involving chemical pesticides, the information, recommendations, and regulations discussed in this SEA and the PEA must be taken into account in design and implementation of any assistance campaign. An Action Plan would need to be developed.

Ideally, by developing a strong base of trained personal and a well-maintained fleet of sturdy vehicles and equipment, the PPD will be able to hold impending l/g and aw outbreaks to a minimum. This will result in considerably less pesticide being used than if these pests were allowed to reach high population levels. In this regard, it is especially important to involve villagers and farmers living in invasion areas in early season control endeavors. These types of efforts, combined with improved legislation and regulations will greatly lessen potential negative environmental impact of pesticide use. Any assistance USAID can offer to build such an institution, with full participation and involvement of the Tanzania PPD and TPRI, as well as potential NGOs/PVOs, would be a far more effective investment than the immense amounts which could be spent on emergency operations (with little effect on sustainability and building national capacity and infrastructure).

The main elements to be included in l/g and also in aw survey programs are:

- Full knowledge of the spatial and temporal distribution of the pest species.
- Monitoring of environmental conditions and changes which might lead to increased numbers of pest species. This will require an adequate knowledge of pest species biology, the status of environmental conditions, and how these conditions can be augmenting or limiting factors.
- A vulnerability assessment in terms of crops threatened by the pest species, including relative importance of crops, and the crop stage of development, including an understanding of the vulnerability of the human population likely to be affected.
- The availability of pest management support resources to be mobilized for control: pesticides, application equipment, as well as logistical and technical support.

4.3.3. Armyworm Species of Economic Importance in Tanzania

Besides locusts and grasshoppers, Tanzania is also attacked by the African armyworm, *S. exempta* (Walker), a Lepidoptera: Noctuidae, moth. The larvae of this moth feed on all types of young graminaceous crops, including, corn, rice, wheat, millet, sorghum, and sugar cane. This pest gets its name from its habit of "marching" in large numbers from grasslands into crops. Awws tend to occur at very high densities during the rainy season, especially after periods of prolonged drought. During the long dry season in Tanzania, aw population densities are very low. Because outbreaks are never observed during the dry season, it is called the "off-season" by those that monitor aw.

The *S. exempta* female can lay a maximum of about 1000 eggs in her lifetime. Eggs hatch in 2-3 days. Six larval instars are completed in 2-3 weeks. Larvae occur in two morphologically distinct forms: a 'gregarious' form, which is black with yellow stripes, and a solitary form, which is green or brown. The morphological form is determined by density -- becoming 'gregarious' at higher densities. However, aw do not exhibit the true gregarious behavior of locusts. It is the gregarious forms of aw that cause outbreaks. Generally, aw are not noticed by farmers until the caterpillars are 10 days old and change from green to black. In the last instar, larvae burrow 2-3 cm into the ground to pupate and adults emerge in 7 to 10 days and live for another 10 days. The moths, migrate over tens, and hundreds, of kilometers between their emergence sites and their oviposition sites. The observation that aw outbreaks can suddenly occur in areas that were free of the pests for several months has led to the hypothesis that the moths migrate hundreds of kilometers.

Evidence for this hypothesis includes:

- 1) outbreaks in a geographical progression at one generation intervals;
- 2) outbreaks are often preceded by high catches of moths and associated with wind convergence;
- 3) results of isozyme analysis imply that aw populations in Kenya, Tanzania, and Zimbabwe regularly inter-breed;
- 4) laboratory tests show that the moths can remain in flight for several hours;
- 5) results of mark and capture studies, and radar tracking indicate long distance, downwind migration of aw moths.

Aw moths tend to fly downwind and infest new areas in regions of wind convergence. These moths fly at night and hide among bushes and tree branches during the day time. There are three distinct periods of flight activity each night for moths: dusk, late evening, and just before dawn. Migratory flights begin the night of emergence; or newly emerged moths congregate in trees and mass migration flights begin at dusk the following night.

During seasons when there are no outbreaks, the aw exists in it's solitary phase (in which caterpillars remain green, are less active, and therefore, less conspicuous). The first outbreaks of the season probably result from concentrations of moths before the synchronized mating and egg laying. These outbreaks frequently follow periods of prolonged drought which could be explained by the fact that plant's have more nutrients than usual, especially nitrogen, following the first rain after a drought and this may account for increased moth fecundity. It is also proposed that outbreaks following droughts may be due to the fact that effectiveness of predators and parasites in regulating population growth may be significantly reduced through droughts. It has been suggested that the outbreaks may result from synchronized ending of pupal diapause, as opposed to mass migration. However, no diapausing pupae have ever been found in the field. Diapause in a small proportion of pupae has been observed in the laboratory.

B. Distribution and Outbreak Regions

In Tanzania, it is hard to find areas which could be free of aw, attack, particularly during outbreak seasons. Over the past ten years, two areas have been identified as the primary aw outbreak areas: a) Central Tanzania, covering the Morogoro-Dodoma-Iringa triangle, b) Northern Tanzania which extends from Tanga to Kilimanjaro regions (Figure 8a). Usually the first outbreaks are reported from these two areas and occasionally from Lindi-Mtwara and/or Southern Highlands.

Figure 8a. Areas affected by the African Armyworm, *Spodoptera exempta* in Tanzania.



viruses may be degraded by enzymes in the grinding process, or rapidly degrade by sunlight, or they may not be transmitted orally. However, the rate of infectivity can be greatly enhanced by formulating NPV with adjuvant to provide protection from sunlight. For example, the addition of Tinopal, an optical brightener to NPV adjuvant prevents degradation of NPV by ultra-violet radiation, thereby greatly increasing the virulence of NPV to *S. frugiperda*.

Other entomopathogens such as *Bacillus thuringiensis* (B.t.) can also be used to control Noctuid caterpillars. B.t. was tried and shown 95% reduction in field trials. Other methods such as reducing the use of broad spectrum insecticides, or replacing them with biological insecticides, such as B.t., allows ants to contribute to *Spodoptera* control.

Anti-feedants such as pyrolidine 2(R), deters feeding in *S. exempta* and in *S. gregaria* and *L. migratoria*. However, due to incomplete coverage, anti-feedants alone are rarely sufficient to protect a crop and should be used as part of an IPM program.

Currently, insecticides are the number one tool used against aw. Several pesticides are used for aw control, including acephate, carbaryl, chlorpyrifos, cypermethrin (a pyrethroid), deltamethrin, fenitrothion, malathion, endosulfan, fenvalerate, permethrin (these three products are neither included in the PEA nor approved by USAID for l/g control). Laboratory studies with IGRs have shown to significantly increase the mortality of another species of armyworm, *S. frugiperda* and the addition of a feeding stimulant as a synergist to the IGR increases its effectiveness.

In Tanzania, large quantities of pesticides are used on annual basis for the control of aw in Tanzania. According to the Assistant Commissioner for the Plant Protection Department of the MOA, PPD alone used over 250,000 liters of different types of pesticides to control aw over the past 3 years.

Table 3. Armyworm outbreaks, crop areas attacked, controlled, or damaged for the 1986/87 and 1991/92 cropping seasons.

season	natural pasture	attacked	crop land	
			destroyed	controlled
1991/92	-	74,238	1,396	54,962
1990/91	-	14,191	15	12,711
1989/90	13,602	80,606	789	66,627
1988/89	95,000	16,290	365	9,909
1987/88	75,000	87,786	8,344	61,760
1986/87	20,000	95,462	3,667	40,317

(source: MOA - PPD, Annual Report 1991/92, Dar es Salaam, Tanzania)

4.3.4. Locust/Grasshopper and Armyworm Crop Loss Assessment

Records on crop losses from l/g and aw infestations in Tanzania is incomplete due to a number of reasons, such as shortage of trained staff, facilities, equipment, etc. However, there is a general understanding that these pests can cause nearly 40% loss and therefore must be controlled. The amount of crop yield that is lost due to an infestation of these insects is a particularly important parameter and should be determined as soon as possible to assist in any decision as to the level and type of assistance that may be contemplated including funds and commodities. Crop loss information is needed to guide both the Tanzania PPD/MPCU and USAID (as well as other donors) to provide appropriate response. Once the infestation levels can be related to yield loss (i.e., economic injury and threshold levels are determined), management operations can be refined to better handle the situation.

In addition to national aggregate crop losses, consideration also needs to be given to the social and economic costs of grain distribution even when losses to individual farmers or villages may be small. Even if the overall crop loss is low, some localized areas, especially in the southern, central, and northwestern parts of the country, may experience high losses. Costs of grain transport over long distances may be more expensive than those of a l/g and aw control program. Losses in grasslands are more difficult to assess than in croplands, because the impacts are on wandering grazing animals, and are thus more indirect.

It is often the case that crop losses will vary geographically. The distribution and success of control efforts among the regions of Tanzania in proportion to infestation levels are not uniform from year to year. Reliable crop production data can be available. If estimates of l/g and aw infestations and efficacy of control efforts were to be kept over a period of years for each region, a much better estimate of cost effectiveness could be made. Such data should be compiled, analyzed, and made available for appropriate planning and designing of pest management programs.

4.3.5. Capacities and Needs of the Plant Protection Department

Tanzania's PPD, which is under the MOA and headed by the Assistant Commissioner for Plant Protection (Appendix IX), is headquartered in Dar es Salaam, with the Regional Plant Protection Offices (RPPO) stationed in each of the 20 regions. In addition, there are close to 120 District Plant Protection Offices (DPPO) in each of the districts throughout the country. Each district has a network of Village Extension Officers (VEO) throughout the country.

The current PPD which was restructured in 1985, is composed of four units -- Product Inspection and Phytosanitary Service, Migratory Pest Control Unit (MPCU), Rodent and Vermin Control, and Pesticides and General Advisory Services. For the second time, the

PPD is being subjected to restructuring. The proposed restructuring focuses on specific core-functions, each with a number of sub-functions. The core-functions being -- policy aspects and formulation, regulatory services, migratory pest services, integrated pest management, and training and development. It is worth noting that the proposed restructuring is still at a concept level.

The level of expertise in the PPD in general, and the MPCU unit (Table 4), in particular needs to be strengthened. Expertise is wanting in areas such as ecotoxicology, environmental monitoring, and pesticide management, including disposal issues. Any efforts to strengthen the PPD should go far beyond l/g and aw and other migratory pests and should deal with the full range of pest problems known to cause economic damage. By and large, MPCU has the technical capacity for survey, monitoring, and forecasting of armyworm in particular. Nevertheless, pest management staff should be strengthened in specific areas, crop loss assessment, biological control, insect pathology, ecotoxicology, and environmental monitoring and risk assessments. Furthermore, the unit could benefit from equipment necessary for survey and monitoring, such as communication radios. Tanzania's PPD could, without any doubt, benefit from technical assistance and training opportunities in the fields of pest and pesticide management, biological control, environmental impacts and risk assessments, phytosanitary, and other relevant fields. Training programs should reflect the country's needs and should be based on priority areas.

PPD has been receiving supports from various international donors such as GTZ, EEC, CIDA, and FAO (mainly through the technical cooperation projects). This SEA commends the assistance provided by these agencies and recommends that such actions should be emulated by others. The SEA also emphasizes the role NGOs, PVOs, and the private sector could play in educating farmers and agricultural advisors in safe use and handling of pesticides.

4.3.6. Integrated Pest Management - IPM.

Integrated pest management utilizes all available control methods to achieve the most economically and environmentally sound management program. It is considered to be the preferred approach to pest control. IPM is not an alternative to the use of chemical pesticides; instead it is an integration of methods which may reduce use of pesticides by employing them more judiciously. Determination of intervention thresholds, correct timing of sprays based on pest population dynamics, and use of non-chemical control agents are among examples of modern and prudent pest management methods.

Table 4. Staffing Level of Department of Plant Protection's Migratory Pest Control Unit (table does not include other PPD staff, located in Dar es Salaam or other regional staff).

Location	No. of	Qualification	Subunit	
Arusha	2	MS	armyworm	
	2	BS	"	
	4	Diploma	"	
	1	Ph.D.	quelea	
	2	MS	"	
	1	BS	"	
	7	Diploma	"	
	10	backup staff (stationed at outbreak areas)	"	
	Dar es Salaam	1	BS	locust
		1	Diploma	"
20		backup staff (stationed at outbreak areas)	"	
Kilima Anga (Areal Spraying Unit) Arusha	2	Spray pilots	shared	
		aircraft mechanics	shared	
	3	technician	"	
	5	automechanics	shared	

(courtesy of Mr. G. Kiranga, PPD, Dar es Salaam, Tanzania, 1995)

IPM can decrease pest losses, lower pesticide use, and reduce overall operation costs while increasing crop yield and stability. Successful IPM programs have been developed for a variety of pests on various crops. Specifics of an IPM program will depend on the crop, cropping system, pest complex, economic values, social conditions, availability of personnel, and other factors and constraints.

IPM is a sensible approach to pest control whereby all existing control methods (pesticides, biological control, cultural control), mitigating factors, environmental concerns, climatic conditions, and ecosystem inter-relationships are integrated to assist in control operation decision making. While pesticides are part of the total

IPM strategy, other methods are considered, with the choice dependant on the methods that most closely fit the situation. Timing of pesticide application is an important factor in IPM, with the early season approach favored because of the low amount of pesticides utilized. IPM is not a pest control method itself but rather, a way of considering options available in light of the physical and biological environment.

The principles of IPM are widely accepted among Tanzanian PPD academic and research institutions. The PPD has initiated a number of preliminary research and demonstration activities to implement IPM. Furthermore, NGOs and private pesticide companies should be enlightened in the principles and practices of IPM.

If USAID chooses to participate in a l/g and aw assistance program, it is important that support be coordinated with other donors and the GOT to achieve desirable results and to make a significant impact. In Tanzania, such assistance should involve the regional locusts control organizations -- DLCO/EA and IRLCO/CSA, and NGOs/PVOs. Assistance for such a program should emphasize the principles of IPM, in which all available management resources are considered. While probable crop loss will be a criterion for USAID involvement in control efforts, sustainable infrastructure development and cost/benefit ratio will also be considered. Participation by USAID in emergency operations will be carefully tempered with an examination of what long-term benefits will be achieved in addition to an insect population decrease. USAID will normally emphasize good survey and use of non-chemical control methods whenever and wherever possible.

5.0. NATURAL ENVIRONMENT, PROTECTED AREAS, AND PESTICIDES

Because pesticides will impact both crop and natural ecosystems, natural resource protection is necessary. This can be accomplished by setting aside areas and zones where pesticides are not used, or are severely restricted. Endangered animals and plants need to be considered in regard l/g and aw operations. Since birds and fish are particularly vulnerable to the direct and indirect impact of pesticides, these organisms need to be given special attention. Areas should be set aside to be protected from pesticide use no matter how great the perceived pest control need. This is particularly relevant for the unique flora and fauna of Tanzania, many of which could be threatened unless appropriate measures are taken to enforce the existing regulations and developing more strict ones. However, as basic economic needs could contribute to the misuse and degradation of natural habitats of wildlife including forests, grasslands, and coastal areas, it is extremely important that any U.S.-funded l/g and aw control program involving pesticides should be carefully monitored and planned in order not to contribute to the already deteriorating environment. Further, methods and materials, which have the least-toxic effects on both crop and natural ecosystems should be searched for while rendering l/g and aw control assistance.

5.1. Tanzania's Fragile Ecosystems - Fauna and Flora

Tanzania's fauna and flora are unique and diverse, with a remarkable degree of endemism manifested at the species and higher taxonomic levels. In Tanzania, 10-15% of the 11,000 plant species are endemic. In addition, 4 of the 20 primates, 2 of the 34 antelopes, 2 of the rodents, 7 of the 27 shrews, 2 of the 7 elephant-shrews, 1 of the 14 fruit bats, 19 of the 1060 birds, 75 of the 290 reptiles, 40 species of amphibians, and 122 of the 213 butterflies are also endemic to Tanzania. As the majority of native terrestrial species in all faunal groups appear to be dependent on the vegetation including forested, wooded, grassland, and aquatic habitats, such areas, in particular, should be protected to the extent possible from disruptive impacts of pesticides. Effects on non-target organisms could negatively affect those species already severely assaulted by habitat loss and increased predation.

Although no comprehensive list was available at the time this SEA was drafted, the Director for the Wildlife Division of the MTNRE, believes that there may be quite a few species of animal (including rhinoceros and elephants) in Tanzania that should be listed as endangered or threatened. In a document titled "World Resources: a guide to the global environment, 1994-95", it is reported that 30 of the 306 mammal, 26 of the 1016 bird, 3 of the 245 reptile, and 160 of the 10,008 higher plant species in Tanzania are listed as endangered or threatened. It should be made clear that no U.S.-funded pesticides or related operations should take place in or around established fragile habitats where such species are known to exist or the most practical measure should be taken under situations that require applications.

While protected areas and animals are covered by several Tanzania's laws and regulations, enforcement usually lacks or is non-existent. Unless more stringent regulations are enforced, much of the unique flora could be easily destroyed. Any U.S.-funded anti-l/g and aw operation must consider the potential impact of pesticides on already threatened animal habitats. While human life cannot be placed below that of an endangered species, early survey, monitoring, and public education and awareness programs can greatly help conservation.

5.2. Protected Areas & Pesticide Use for Locust/Grasshopper & Armyworm Control in Tanzania

Tanzania has one of the most elaborate parks and games reserves in Africa. Tanzania protected areas are classified into five major categories: 1) National Parks (NP), 2) Game Reserves (GR), 3) Conservation Area (CA), and 4) Game Controlled Areas (GCA), and 5) Forest Reserves (FR). The country is well known for its unique biodiversity, including flora and fauna which exist in various types of protected areas located throughout the country (Figure 10). To date, there are 12 NPs, 23 GRs, 1 CA, 44 GCAs, and 574 FRs covering

area close to 378,000 sq. km., about 35% of the total surface area (Table 5). Many of these PAs are internationally renowned and four (Serengeti, and Kilimanjaro National Parks, Ngorongoro Controlled Area and Selous Game Reserve) have been designated as World Heritage Sites; whereas Serengeti, Ngorongoro, and Lake Manyara National Parks are also designated as Biosphere Reserves.

When engaging in l/g and aw control operations, the USAID should, at all times, encourage the protection of these and all other potential fragile areas.

National Environmental Regulations should address protection of fragile habitats, including aquatic ecosystems -- estuarine, freshwater lakes, and riverines from pesticide applications. Protected areas should be surrounded by a pesticide-free buffer zone to avoid accidental pesticide contamination (e.g., spray drift). Normally, 2.0 km wide buffer zones are recommended for aerial spraying near protected areas where wind-driven drift is likely. However, it may be more practical and reasonable to reduce the buffer zones to 500 meters wide or less under still-air conditions. Targeted ground-based application does not require large buffer zones. Under such circumstances, leaving 100 to 200 meters wide untreated areas may be adequate to warrant the level of desired protection. Within buffer zones, and in protected areas, priority should be given to the use of alternatives to chemical pesticides, and a monitoring program so that non-chemical alternatives can be applied. Any l/g and aw and other pest control programs carried in areas surrounding buffer should be limited to the pesticide with the lowest potential for impact on non-target species and with acceptable efficacy for the target species. Whenever possible, non-chemical bio pesticides should be used in these areas.

The implementation of fragile area protection programs must be conducted by the itself. Enforcement of regulations to ensure sensitive areas are actually protected is to the ultimate benefit of the people of Tanzania, and must therefore be made a priority. The effectiveness of protection programs is closely linked with integration of local populations to build a feeling of responsibility. Donors should monitor the protection program, assisting it if necessary, and they may even wish to base funding levels on the level of commitment for environmental protection.

5.3. Alternatives to Chemical Pesticide Use in Sensitive Areas

Farmers living in areas which have been designated as environmentally sensitive should be given training in IPM and the use of control methods which do not involve chemical pesticides, such as pathogens, predators, parasites and parasitoids. These farmers should be encouraged to use traditional methods and should be informed as to how pesticides can be dangerous to both humans and the environment. PPD trainers should have a basic knowledge concerning the relationships between plants and associated animals

Table 5. Classification of protected areas of Tanzania, human settlement and estimated coverage (km²).

Class of Protection	human settlement	coverage
National Parks	no	38,428
Game Reserves	no	104,012
Conservation Areas	yes	8,300
Game Controlled Area	yes	90,865
Forest Reserves	no	136,653
Total		378,258

(Source: USAID, Wildlife Sector Review Task Force, 1995)

and the natural balance that binds them together in light of the disruptive effects of pesticides on such balances.

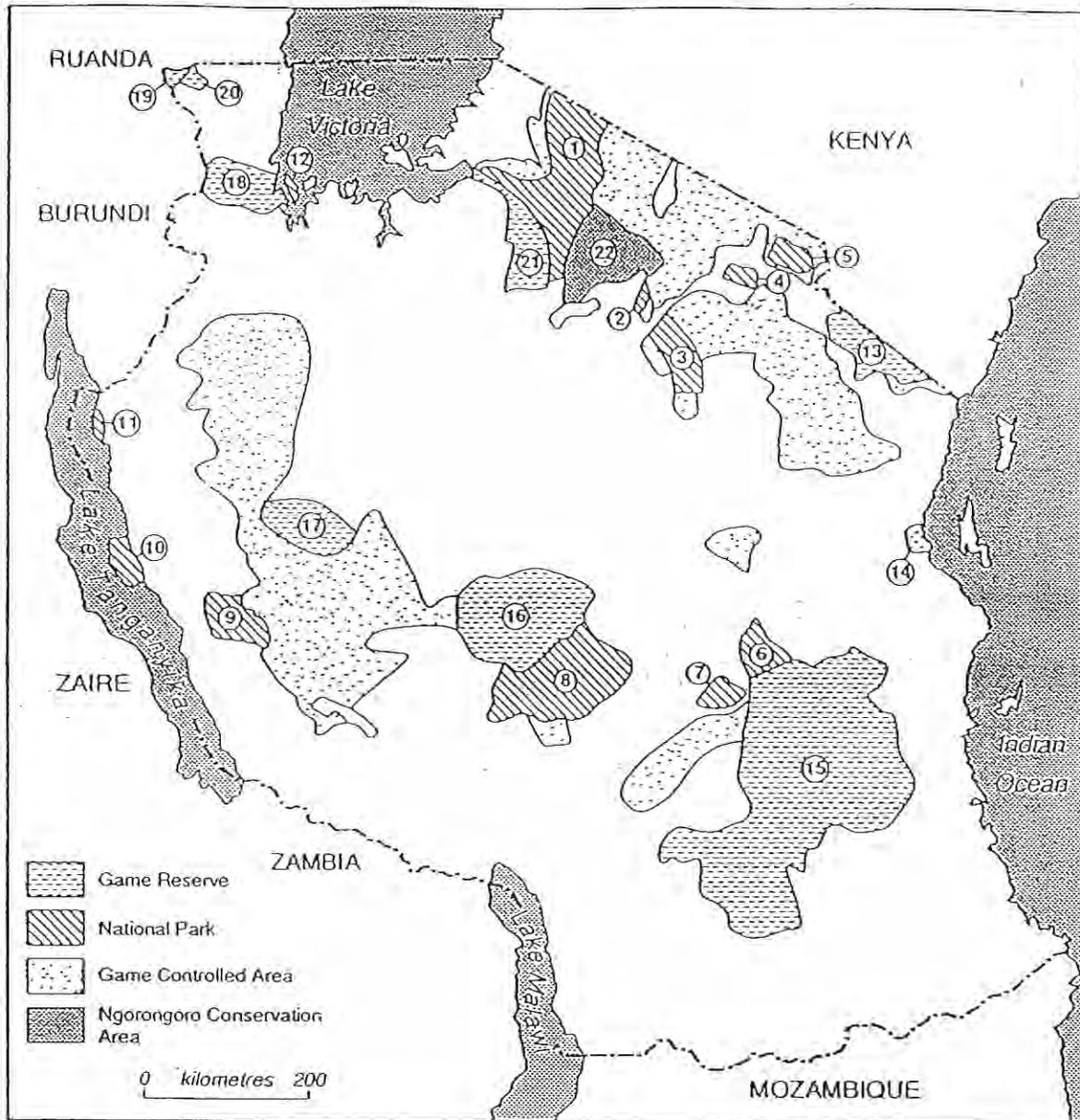
6.0. SELECTION AND MANAGEMENT OF PESTICIDES

6.1. Tanzania Pesticide Regulations

To facilitate the proper and safe use of pesticides, regulations and enforcement are necessary. These regulations cover the importation of pesticides, the distribution to agricultural areas, the actual use of the pesticide, and the disposal of unwanted pesticides and used containers. In essence, pesticide regulations are meant to give the government the mandate to regulate all activities related to pesticides, including importation, distribution, sale and use.

Tanzania established TPRI through the 1979 Tropical Pesticide Research Institute Act (Appendix X) which was passed by the Parliament. Five years later, in 1984, the country enacted its first ever pesticide regulation (Appendix XI) which has made Tanzania one of the three countries of the Southern African Development Community (SADC) that have pesticide control regulations. Although this regulation falls short of a full fledged legislation, it is the only mechanism that controls importation, distribution, and use of pesticides in the country. This regulation does not take into account the FAO Code of Conduct for Distribution and Use of Pesticides, as the latter was effected a year later than the former and the pesticide regulation has not yet been amended to fully address the FAO's Pesticide Code of Conduct. Nevertheless, its enactment has allowed for a pesticide registration scheme to be put in place with the power of monitoring and governing vested upon the Tropical Pesticide Research Institute (TPRI) headquartered in Arusha. This regulation outlines the requirements necessary for

Figure 10. Map of Protected Areas of Tanzania



Conservation Areas

- | | |
|------------------------------|---|
| 1. Serengeti National Park | 13. Mkomazi Game Reserve |
| 2. Manyara National Park | 14. Sadani Game Reserve |
| 3. Tarangire National Park | 15. Selous Game Reserve |
| 4. Arusha National Park | 16. Rungwa/Kizigo Game Reserves |
| 5. Kilimanjaro National Park | 17. Ugala River Game Reserve |
| 6. Mikumi National Park | 18. Biharamulo and Burigi Game Reserves |
| 7. Udzungwa National Park | 19. Ibanda Game Reserve |
| 8. Ruaha National Park | 20. Rumanyika Game Reserve |
| 9. Katavi National Park | 21. Maswa Game Reserve |
| 10. Mahale National Park | 22. Ngorongoro Conservation Area |
| 11. Gombe National Park | |
| 12. Rubondo National Park | |

importation, classification, labelling, safety precautions, handling and usage of pesticides. To date, over 370 products have been registered by TPRI for use in Tanzania (Appendix XII). Between 1986 and 1993, over 70 import permits for various pesticide products were issued by the Institute (Appendix XIII).

These regulations essentially control import, distribution, sale, and use of pesticides in the country the responsibility of which is within the domain of TPRI. However, due to lack of proper legislation, shortage of technical staff and expertise at TPRI, pesticide regulations are often not properly implemented and enforced. Tanzania pesticide regulations require the granting of pre-import clearance prior to pesticide import, with the TPRI issuing clearances for importation.

Any locust, grasshopper, or armyworm related assistance to Tanzania by the U.S. that will involve pesticide procurement, transport, application, or disposal, should be controlled, not only by Tanzania's pesticide regulations, but also by U.S. pesticide regulations and procedures. Only those pesticides listed on the USAID-approved list for l/g control (Appendix IV), most of which are also suitable for use against aw (including acephate, carbaryl, chlorpyrifos, diazinon, fenitrothion, lambda-cyhalothrin, and malathion). Those approved by FAO for use against armyworm, can not be considered unless this SEA is amended to include other pesticides, for which necessary impact assessments are completed and approved by the Regional Bureau Environmental Officer.

6.2 Pesticide Management

6.2.1. Pesticide Procurement and Distribution

Tanzania's pesticide requirements are met through importation of formulated products and in-country formulation (Appendix XIV) of various types of pesticides.

6.2.2. Pesticide Selection

The impacts of pesticides on the environment and associated health risks to humans makes the way pesticides are selected and used an important aspect of management programs. Due to the unique ecology and bio-diversity of Tanzania, pesticides should be used with extra caution, and only when necessary.

To use a pesticide in a specific area at specific times, it is necessary to have detailed knowledge of the physical and chemical attributes of the product, the ecology of the area to be treated, as well as the biology of the target pest or pests. Pesticides intended to be used for locust and grasshopper control, in addition to being approved by FAO, USAID, or other regional organizations responsible for the control operation, should possess the following qualities:

- ▶ Effectiveness at low application rates;
- ▶ None to minimal effects on nontarget organisms, including people and animals, and specifically predators and parasites of locusts/grasshoppers;
- ▶ Minimum persistence of residues on and in native fauna, flora, aquatic systems, soil, and crops;
- ▶ Low toxicity and ease of handling;
- ▶ Good storage capacity and shelf-life;
- ▶ Compatibility with existing application equipment.

Although a number of pesticides have been used in Tanzania against l/g and aw in the past, any pesticide involved in an operation funded by the USG must be approved for use in the United States by the Environmental Protection Agency (EPA) or such pesticide products should be those approved by the FAO for the proposed use(s). Several USEPA-approved pesticides are listed in the Programmatic Environmental Assessment (PEA) and this list has been clarified and updated in STATE 118760 (Appendix IV), and includes nine pesticides. This list should be referred to during both the planning and implementation of phases of l/g control. In addition, existing local regulations governing the use of a particular pesticide, and instructions set forth on the label, must be strictly observed.

It is worth noting that many of the USAID-approved pesticides for l/g control are widely used (e.g., carbaryl, chlorpyrifos, fenitrothion, and malathion) for the control of aw larvae in crop lands and pasture, and/or are recommended for such use (e.g., acephate, bendiocarb, carbaryl, chlorpyrifos, diazinon, fenitrothion, lambda-cyhalothrin, malathion, and tralomethrin) making the PEA and USAID approved lists useable for aw control. Other pesticides that are recommended for aw control (Rose, et al., in press) include: trichlorphon, phoxim, quinalphos, tretrachlorvinphos, pirimiphos methyl, cypermethrin, deltamethrin, fenvalerate, and permethrin).

When using pesticides provided by the USG or procured with USG funds, appropriate instructions and good agricultural practices should be strictly observed. Furthermore, no USG funds should be used for the purchase, transport, or application of pesticides that have been banned by the EPA.

It is particularly important to note that five (bendiocarb, chlorpyrifos, fenitrothion, lambda-cyhalothrin, and tralomethrin) of the USAID-approved pesticides for l/g locust control are Restricted Use Pesticides (RUP) in the U.S. This underlines the need for proper consultation with local authorities prior to making decisions as to use. Also, only properly and fully trained applicators should be using these restricted use products.

Bendiocarb, malathion, acephate, lambda-cyhalothrin and tralomethrin are among the pesticides preferred for use in

terrestrial ecosystems and are thus included in the updated list of USAID-approved pesticides for l/g control; these pesticides are also suitable for use against aw. Acephate would be the pesticide of preference, from an environmental standpoint, for use near aquatic ecosystems as it is less toxic to fish, and is systemic in plants, thus best used for larval control. Acephate can be considered to be one of the safest pesticides in use. However, it should be noted that there is always the possibility for aquatic contamination with any pesticide application; hence care must be taken while handling such products near aquatic habitats.

Carbaryl is toxicologically acceptable, but in certain formulations it is more difficult to store and apply (especially from aircraft), than other approved pesticides and is very toxic to bees. Diazinon and chlorpyrifos are registered for use and are also included in the USAID-approved list. Fenitrothion should be used only with extra precautions and with mitigative measures. This pesticide is known to pose serious adverse side-effects, particularly on avian species. Tanzania has extensive aquatic habitats including rivers, swamps, lakes, irrigation complexes, and marine habitats. These resources in Tanzania should be protected from pesticide contamination as much as possible and pesticide selection for l/g and aw control should be the ones listed as USAID-approved pesticides, particularly when involving funds from USG.

Chlorinated hydrocarbons, such as dieldrin and lindane, are not acceptable for use under any circumstances, due to their environmental persistence, bio-accumulation, acute toxicity and broad spectrum target range. It should be noted that U.S.-funds cannot be used in any way whatsoever in connection with these pesticides. This includes funding any aspect of ground application or aircraft which spray chlorinated hydrocarbons, or the transport of such materials.

The author of this SEA discovered that a number of agricultural and public health pesticides are illegally imported into Tanzania through different ports of entry, including the port of Dar es Salaam. TPRI has pesticide inspectors at various ports of entry, however, there is a critical shortage of such persons to effectively control illegal importation of pesticides into the country. This SEA recommends that the country's pesticide regulatory body be enhanced, and pesticides imported illegally should be prohibited from being put to use as such products may not meet safety and efficacy standards set by the Tanzania's TPRI not to mention that they may all together be obsolete and banned in the source country.

6.2.3. Pesticide Labeling

Pesticide labeling is a way to give important information to the pesticide user. The label is the main and often only medium for instructing users in correct and safe use practices. The 1979 TPRI

Act requires that every registered pesticide distributed, sold, offered, or exposed for sale shall bear on the container a name, a true description of the active ingredient (a.i.), proportions of the a.i. and other components by weight or volume, a description of precautions to be taken, and the words "Approved by TPRI", as well as the name and address of the person, company, or firm which manufactured or formulated it.

The 1984 Pesticides Control Regulations (PCR) which empowers TPRI and strengthens the 1979 Act elaborates and requires, among other things, that pesticide labels should also include batch number, description of the physical form, and purpose of the pesticide, common name of its a.i., trade mark and commercial names of the product. The PCR also requires that essential instructions including directions on the use of the product should be written in both English and the Swahili languages. Information on recommended dose rates, methods and timing of applications, compatibility with other products or substances, category and limitations of the use of the product, expiry date, shelf-life, warning signs, recommendations on storage and disposal options, etc. It is also required that the word SUMU "POISON" written in bold red letters should appear at the top-center of the label together with the skull and cross bones drawing. While this SEA commends this effort, it also stresses that the labeling process should be strictly enforced and such process should also go hand-in-hand with FAO Code of Conduct on pesticides. Both registration and proper labeling require good solid legislation at the national level.

While labeling must be specific to local needs and the social environment of Tanzania, the FAO has prepared a global set of guidelines which can assist a labeling program. In addition to enacting legislation, the GOT should insist that donated pesticides be labeled in comprehensive language as required by donor country law, and be in Swahili and English language.

6.3. Managing Pesticide Stocks

One of the basic requirements for managing pesticide stocks is a secured pesticide storage facility. Such facility should include:

- a fenced and covered area for the pesticides and a warehouse that is:

- 1) isolated from dwellings in order to avoid fire, leakage, and contamination of surface and ground water;
- 2) supplied with water in order to clean spills and fight fire;
- 3) supplied with a shower for the people who handle pesticides
- 4) aerated to avoid toxic fume concentration;
- 5) regularly inventoried;
- 6) equipped with protective gear such as overalls, boots, gloves, goggles, breathing masks, and respirators;
- 7) stocked with a first aid kit with antidotes;

8) staffed with trained personnel who are familiar with diagnosis and treatment of pesticide poisoning.

A management system is needed to record the date each pesticide arrived at the facility, how long it stays in storage, and when it is removed for use. In addition, the storage requirements for each pesticide must be posted and known by the management staff. Stored pesticides must be tested periodically to insure that the active ingredient is as described on the label, and that the formulation concentration is correct. Also the disposal of unused and obsolete pesticides, and the destruction of their containers, must be part of the management system.

Successes of l/g and aw control campaigns depend, among other things, on availability of pesticides in the areas which need treatment. Pesticides should be placed in safe and secure storage areas as close as possible to agricultural and/or key outbreak areas which will likely need treatment. Whenever possible, monthly inventory of products and materials should be made and sent to the PPD in Dar es Salaam and to regional representatives in major operation centers. Distribution of products to bases should be done according to need and severity of the l/g and aw threat, as well as the degree of isolation during rainy season. Pesticide stocks must be securely in place at key operation stations before the rainy season.

In addition to management of the pesticides themselves, the PPD stations must adequately manage pesticide application equipment.

This SEA recommends that pesticide storage practices should include the following:

- 1) use those pesticides stored in damaged drums first and handle drums more carefully in the future so they will not become damaged;
- 2) do not accept any unlabeled containers;
- 3) store all containers on pallets away from the walls, label all batches with date-in and planned date-out, and practice the principle of "first-in-first-out";
- 4) impose more rigorous handling practices to prevent spillage;
- 5) install a sun shade to minimize direct exposure of containers to the sun. These practices should apply to all storage areas, regardless of size.

6.3.1. Obsolete Pesticides and Pesticide Containers

Due to lack of appropriate technology for safe handling, and because Tanzanian farmers often times find alternative uses for

Research on the field use of microbial agents in l/g control is currently being conducted by Montana State University through USAID funding and by other international organizations. The fungal pathogen *Beauveria bassiana* has been tested in the U.S. and in parts of Africa for its control potential. A *B. bassiana* strain which was developed by Mycotech Corporation has received full registration by the EPA for use against l/g. Preliminary results from Cape Verde, Mali and Madagascar indicate that also *Metarhizium* can be important biological control agents.

In working with microbial pest control agents, attention must be given to handling and application techniques. Some may have a short shelf life and must be used soon after production. In addition, the climatic and environmental conditions will impact on the microbial control agent. Formulation appears to play an important part in the longevity of the material under field conditions.

Tanzania's PPD has shown strong interest and inclinations towards adopting IPM programs, including focused development of biological control agents and other agronomic practices in its pest control operations. The PPD, Sokoine University, TPRI, and the National Biological Control Center (NBCC), Kibaha Research Facilities (30 km outside Dar es Salaam), should be supported in developing applied research programs, including exploration for local and possibly more specific pathogens for l/g and aw, as well as for other important pests. This could be done in collaboration with the above institutions, and regional organizations such as DLCO/EA and IRLCO/CSA) as well as international organizations that pursue such activities.

Tanzania's rich flora, including considerable number of trees that could possess pesticidal properties, should attract the search for the development of plant-based pest control agents that may possess the potential for use as part of IPM programs. As many of these materials probably are already being used by villagers as a traditional means of pest control, research in this area could be a worthwhile venture.

Other fruitful research areas might include use of synthetic insect growth regulators. These agents are considered alternatives to conventional pesticides because of their different mode of action. However, there may be adverse impacts on non-target aquatic invertebrates.

Due to their toxic nature, pesticides will have impacts on both agro-ecosystems and nearby habitats. Care must be taken during the handling, transport, application, and disposal process to minimize ecological disruption in both target and non-target areas. In addressing this issue in regard to operational planning, risks to the environment must be considered in terms of early intervention versus reactive large scale operations. The latter would involve

considerably greater amounts of pesticides, and correspondingly higher risks.

Because of the additional risks associated with late season control operations, management operations designed to avoid such risks are encouraged. Early survey and pest management can prevent later more expensive control operations, with significantly less pesticide usage. Preventive management operations with attention on survey operations aimed at locating and delimiting pest populations, and spot treatment operations intended reduce population numbers using as little pesticide as possible are favored.

By reducing the number of hectares sprayed, early control operations use less fuel and pesticide. Because the early control strategy potentially involves considerably fewer resources than larger-scale emergency or curative treatments, the PPD would be better able to implement it without donor assistance. This should promote a greater degree of self-dependence and control of the situation by the PPD itself.

If pesticide use is necessary, the type of ecosystem in the treatment area, and associated non-target species should be major factors determining the choice of pesticide. A pesticide's characteristics, such as selectivity, mobility in ground water, persistence, and metabolic products should be considered as important as effectiveness against target species. In addition, alternative application methods should be considered, with ground application having less impact than aerial treatment. Bait application methods have been highly effective in appropriate situations as well, and tend to be less problematic environmentally.

The response of different animals and ecosystems to pesticide exposure varies dramatically. For example, carbaryl has only low toxicity to birds, but is extremely toxic to aquatic invertebrates and certain estuarine organisms. While application of carbaryl may be appropriate in areas providing upland habitat for birds, its application in areas important to waterfowl and migratory shorebirds, such as national parks or game and forest reserves as well as lake regions, coastal and riverine areas, should be prohibited.

Although this SEA strongly recommends against any pesticide applications in aquatic systems, acephate is relatively nontoxic to freshwater fish and invertebrates and is the least likely of the selected pesticides to have adverse effects on aquatic habitats. Acephate should be one of the preferred pesticides if applications are necessary adjacent to aquatic systems, particularly in and around fragile areas, or critical animal, bird or fish habitat. Due to its mobility in soils, however, acephate has the potential to contaminate ground water.

7.0. PESTICIDE IMPACT EVALUATION AND MITIGATION

7.1. Pesticide Toxicity in Human Populations in Treatment Areas

The potential for adverse effects on human health increases significantly when pesticides use is high. When large areas of the country are treated and large amounts of pesticide products are being shipped, distributed, and applied, the probability of human (and the environmental) exposure is proportionately greater. This SEA advocates prevention of human exposure as the best approach to minimizing adverse health impacts. A major aspect of prevention is to keep l/g and aw at low population levels with preventative control strategies, through regular survey and monitoring procedures.

This SEA commends efforts made by SUA, TPRI, PPD, and MOH to inform the public on pesticide safety measures and urges that such efforts should be scaled up to reach wider audience and include vigorous public awareness, and supervising the applicators to ensure that exposure of the general population is kept at or below an acceptable level. Such training and supervision should be continuous and should recognize different pesticide active ingredients, formulations, and application methods.

The general public is at minimal risk if the necessary precautions are taken, but should nevertheless be informed about pesticide application against locusts. This can be achieved by a number of means, such as posters, the radio, local newspapers, Televisions. The efforts by the MOA, TPRI and the MOH is in educating the general public on the safe use of pesticides, and this should be continued and enhanced. Public health advisories given in other countries though radio broadcasts, newspapers, public gatherings, that have been found effective in warning the farmers prior to aerial applications should be included in plans for future applications. This is especially important in areas where people may eat locusts and grasshoppers.

Pesticide applicators are generally at the highest risk for any adverse effects, and are several orders of magnitude higher than the general population since they are often handling concentrated products; increasingly, this includes ultra-low volume (ULV) insecticides. In addition to the training and supervision indicated above, applicators should be thoroughly familiar with the level of danger from the pesticide, and should be provided with equipment that is in good working condition in order to minimize accidents. Such equipment may include pumps to transfer pesticides, body protection in the form of gloves, aprons and safety shields for the face to prevent dermal exposure and respirators to prevent inhalation boots to prevent pesticide contact with legs and feet.

It is particularly important that some form of protection is worn during the short periods while handling the concentrates. If at all possible (as in most cases spray areas get hot and humid), long sleeved shirts and pants should be used, and washed after each use. Appropriate logos, patches or other attractive designs/messages with teaching value on the protective clothing items can help to induce safe use and care.

Exposure of applicators is mostly through the skin. Though the skin usually provides a significant barrier to the entry of some pesticides, even those penetrate into the body if the contamination is left on the skin. In addition, some pesticides penetrate the skin more readily. Therefore, applicators should wash any exposed areas of their bodies frequently.

7.2. National Capacity in Public Health Provisions

Tanzania's health care delivery system is comprehensively structured and consists of six levels: Village Health Posts (VHP), Dispensary(ies) (D), Rural Health Centers (RHC), District and Rural Hospitals (DRH), Regional Hospitals (RH), and Consultant and Specialized Hospitals (CSH). In addition to the government health system, NGOs and PVOs (such as TOHS) and other agencies, parastatal, and private company hospitals, provide health services. To date, there are 175 hospitals; 2,914 Ds (excluding parastatals and private dispensaries), and 276 RHC. The country has 1,180 physicians, 806 health auxiliaries, 4,543 rural medical aids, 4,913 village midwives. The doctor to population ratio is 1:23,364, for D the ratio is 1:98,000, and 1:161,000 for hospitals (Table 7).

The SEA discovered that the public health delivery system in Tanzania is inadequate to handle severe pesticide poisoning cases. This SEA has found that the main referral unit responsible for identifying pesticide poisoning is the government chemical laboratory. This laboratory is headquartered in Dar es Salaam with five branch laboratories in selected regions. In theory, the public health structure that branches out to the district level is supposed to have technical staff capable of identifying and treating general chemical poisoning including pesticides which are also meant to serve 10,000 persons. In reality, even regional hospitals do not seem to have the technical capability to diagnose properly treat pesticide poisoning. This SEA encourages that application crews should be self-sufficient in handling medical emergencies. Supervisors must be familiar with safe handling of pesticides and be able to administer any needed first aid, including antidotes for pesticide poisoning. People who are dealing with pesticides should be familiar with the early warning signs of poisoning. Workers must be removed from contact with pesticides at the first signs of poisoning. All hospitals and clinics in an area which is likely to be involved in a pesticide spray operation should be provided with information materials on the pesticides to be used in the area. The

Table 7. Basic Data on Health Facilities and Personnel for 1992 in Tanzania.

Health Facilities	Number	Beds	Physicians	Nursing/ Cadres
Hospitals:				
Central and Regional	175 20		1,134	27,908
District health centers	120			

(Source: UNDP, 1993)

The personnel of these centers should be given the necessary training to recognize and treat pesticide poisonings.

In conjunction with any donor assistance regarding l/g and aw control efforts, it is important that the GOT monitor both human health and the natural environment. In regard to protecting human health, it is necessary to train both the medical community and pesticide applicators of the potential hazards of pesticides, and steps to mitigate any problem that may surface. Application of a pesticide in a given area should be preceded by public awareness and extension activities and education of the users. PPD, MOH, and TPRI should continue informing the public that pesticides are dangerous and that empty pesticide containers should not be used for food or water storage.

A good public information program should include:

- information on the specific pesticides and labels;
- safe methods of pesticide transport and storage;
- measures in cases of container leakage;
- conditions for pesticide use;
- safe use of application equipment;
- prevention of pesticide poisoning.

7.3. Education and Training of Target and General Populations in Pesticide Safety Measures

Pesticide educational programs should also be instituted by Health Engineering and Sanitary Service agents. Health education and extension programs can also provide information on first aid in pesticide poisoning cases. The inherent toxicity of used pesticide containers is an important subject area, and should be specifically directed to women who are apt to use the containers for cooking or

should include photographs, posters, and prints on cloth. These should be given to agents as visual aids to hang on walls of schools, dispensaries, and on large trees in villages and towns.

Radio broadcasts are an important part of a public information campaign, including pesticide awareness information in the form of brief safety announcements, musical programs, interviews, debates, and dramas. Discussions of pesticide regulations and legislation should also be presented, including information on which pesticides are legal and which are prohibited in Tanzania. This will allow potential buyers and users to know what pesticides should be accepted and what should be refused.

7.3.1. Applicator Safety Training

USAID has supported PPD pesticide safety training in the past in Africa, and has found this to be a useful and often sustainable use of funds. It is important that well trained PPD agents are available in Tanzania to work with any USG assistance that may involve pesticides.

Hands-on pesticide safety and application training courses should be incorporated into the academic course of plant production and protection fields of study. This approach will allow trained individuals to interact with the actual users of pesticides.

Properly trained PPD, and agricultural extension agents are encouraged to work with farmers and village brigades when such brigades are available or with farmers' representatives when the former groups are non-existent, in "Train-the-Trainer" programs. This type of training will allow essential information on pesticide safety and application to reach all who may be working with pesticides.

7.4. Pesticide Exposure Monitoring in Humans and the Environmental Exposure

Pesticides do increase agricultural productivity and are thus a useful part of agricultural production. However, when misused by farmers and other applicators, they can present hazards to the humans and the environment. Often, pesticides intended for agricultural or public health purposes may be misused for fishing, hunting, and general household insect control which increases the hazard of such products. By placing **strong emphasis on "good and safe practices" in pesticide use**, a large step is taken towards mitigation and avoidance of problems in the first place, and this will reduce the need for initiating resource-intensive monitoring efforts.

7.4.1. Monitoring Human Exposure

Simple and effective health monitoring of those involved in pesticide handling, application, and storage is essential to a good management operation. This involves teaching all involved with pesticides what the symptoms of pesticide poisoning are, and when first-aid might be required. It is especially important to use behavioral observation to decide if workers should be immediately removed from pesticide exposure.

In addition to the potential for unsafe application, pesticides may also affect public health by being stored improperly. It is important to keep stored pesticides in good condition, away from humans and other animals. Any unwanted or leaking pesticides must be repacked or disposed of as soon as possible. Because pesticides have the potential for misuse, it is essential that existing legislation on pesticide use be enforced. While abuse may still occur, implementation of regulations will provide a sound base for promoting public health and environmental integrity.

TPRI has very limited capability to monitor the behavioral symptoms and blood haemoglobin and acetylcholinesterase (AChE) inhibition that result from pesticide (particularly for OP and carbamate) poisoning. TPRI staff seldom go on field trips to obtain blood samples from pesticide operation sites and adjacent villages. Currently there are two technicians and a senior researcher at TPRI, Arusha site that can perform this task. However this is a fairly simple and inexpensive test, and can be performed by people who could be trained by TPRI staff.

A Lovibond test kit (enough for an initial 1000 samples) and an EQM Cholinesterase Kit can be obtained and used for monitoring the individuals most exposed to organophosphate pesticides. The Medical School at Muhembili, Dar es Salaam could send its students to the MOH and other ministries to do collaborative projects. Likewise, monitoring pesticide impacts on human health could be incorporated into the study programs of the students of this and similar other Schools if not already done. It is worth noting that limited activities in monitoring for actual symptoms of pesticide exposure, and environmental residues can be conducted by the TPRI environmental pollution monitoring section and such activities should be strengthened.

In areas of wide-spread heavy pesticide use, epidemiological case control studies are often useful to detect human exposure. But such studies are difficult under the most ideal conditions which monitor the health and the environmental conditions of the participating individuals on a regular and continued basis over a period of several years, possibly a life time. This is believed not to be unrealistic in Tanzania at this time due to lack of sufficient number of staff and owing to limited facilities.

7.4.2. Monitoring Environmental Exposure

Measurement of residue levels in the environment can also be valuable information for assessing exposure and determining if modifications to treatment operations are needed. However, Tanzania's PPD does not have either the technical capability or the required equipment to conduct residue analysis for environmental monitoring as well as quality control. It is true that National Chemical Laboratory of the MOH possesses the necessary equipment, but due to the heavy demand for it in other analytical work, it seldom accepts requests for pesticide analysis.

Measuring pesticide residues in the environment is, in principle, an excellent way of monitoring, and will require a residue analysis laboratory for full implementation. Anti-l/g and aw pesticide programs should incorporate residue analysis where appropriate into project plans, and should include qualitative behavioral observations of non-target organisms near any pesticide target areas. Tanzania's PPD applicators must be trained to note unusual behavior among fauna of the area.

Aquatic systems are often critical habitats for sensitive species and migratory birds. Therefore, pesticide use near such habitats should be avoided wherever possible. Care must especially be taken when pesticides are applied during or close to the time of seasonal rains. This may lead to introduction of the pesticide into water supplies or aquatic systems in runoff. Because invertebrates are generally much more sensitive to insecticides than vertebrates, monitoring the observable effects of pesticide use on invertebrates, should be the preferred method for monitoring aquatic habitats. Vertebrates, however, should not be ignored, as pesticide effects on them may be indirect, but no less severe.

A similar monitoring approach should be used for pesticide use in terrestrial ecosystems. Selection of soil microorganisms or other low tolerance invertebrates as indicator species is recommended. Monitoring animals of economic value or threatened status should also be required. In cases where pesticide persistence is an issue, residues should be measured. Populations of vertebrate predators, such as birds of prey, are likely to fluctuate too much to make population counts an effective monitoring tool. However, reproduction monitoring of carnivores (e.g., observations of egg conditions, birth defects, infant mortality) may be a useful tool in determining the effects of pesticides known to affect reproductive success, particularly in cases where baseline data are known.

8.0. RECOMMENDATIONS AND FINDINGS OF THE SEA

8.1. Outline of Supplemental Environmental Assessment Recommendations

The following recommendations are listed in a fashion consistent with and in same order as the 38 recommendations in the Programmatic Environmental Assessment for Locust and Grasshopper Control in Africa and Asia (TAMS/CICP 1989). They are structured to provide a prioritized approach to response in the event the USAID considers support for l/g and aw control in Tanzania.

The following list provides the outline of the recommendations as subsequently organized under common subheadings.

I. OVERARCHING RECOMMENDATION

- Support l/g and aw control programs, with emphasis on Integrated Pest Management approaches.

II. TOP PRIORITY IN OUTBREAK SITUATIONS AND FOR PREVENTION & MITIGATION

- Inventory and mapping procedures
- Mitigation of non-target pesticide effects
- Proper application of insecticides

SECTION III: HIGH PRIORITY TO BE IMPLEMENTED AS SOON AS RESOURCES CAN BE ALLOCATED

- Disposal of pesticides
- Pesticide management
- Biological control
- Training and human resources
- Economic & cost benefit considerations
- Pesticide and environmental policy
- Pesticide handbook
- Support and training

SECTION V: DESIRABLE BUT NOT OF SAME URGENCY AS THE ABOVE, UNDER OUTBREAK CIRCUMSTANCES

- Proper pesticide storage
- Forecasting & early warning
- Public health monitoring
- Applied research

SECTION VI. PROCEDURES TO FACILITATE AND ACCELERATE DEVELOPMENT AND IMPLEMENTATION OF RECOMMENDATIONS

**RECOMMENDATIONS AND FINDINGS OF THIS SEA BASED ON THE PEA
FINDINGS AS APPLICABLE TO TANZANIA OF THIS SEA**

GROUP I. OVERARCHING RECOMMENDATION

1. Should USAID decide to become involved in l/g and aw as these pests can directly negatively impact food security, the approach to be adopted should emphasize prevention and evolve toward one of Integrated Pest Management.

In principle, SEA endorses IPM as a strategic approach to crop protection which can also minimize adverse potential impacts of pesticides on public health and the environment. Commitment to IPM can lead to sustainable capacity in the host country to deal with locust, grasshopper and other pest outbreaks which regularly will threaten crop production. It emphasizes building up the longer-term capacities of the farmers, non-governmental organizations and appropriate governmental agencies so that they can assume responsibility for prevention and treatment of outbreaks with an array of options. The Division of Plant Protection (PPD), with the support of GTZ's Plant Protection Support Project, is strongly committed to IPM. USAID could identify ways to be supportive of the longer-term enhancement of plant protection capacities of NGOs and farmers, such as through possible PVO support projects. It may be possible to identify programmatic linkages with the USAID/Tanzania food security related country strategic plan.

**GROUP II. TOP PRIORITY IN TIMES OF OUTBREAK INVENTORY AND
MAPPING**

2. Inventory and Mapping of Environmentally Sensitive Areas: an inventory and mapping program is needed to determine the extent and boundaries of environmentally fragile areas with respect to probable l/g and aw outbreak areas.

While specific areas to be protected in the event of an outbreak can be identified. In addition, Tanzania is currently working hard to develop a wide range of environmental and natural resources laws and standards. National Environmental Policy is being worked on. National Environmental Action Plan has been drafted. This SEA recommends that while the current trend of developing regulations and laws is encouraging, a fully functional regulatory structure should be implemented; this will help minimize adverse side effects that may result from locust and grasshopper control activities and programs.

3. A system of dynamic inventory of pesticide chemical stocks should be developed.

The need for an appropriate inventory and record-keeping system is clear and highly recommended. Tanzania will need a fully functional pesticide legislation, stock survey and management process/system. This is needed at all levels, and would be especially useful to help manage pesticide flows during pest

emergencies. It also would reduce the risks of further aggravating the obsolete pesticide stocks problem (Rec. #4) by minimizing the amount that pesticide products becoming unusable and thus needing to be disposed of, and will minimize environmental and health hazards. MOA no longer subsidizes agricultural inputs such as pesticides. An adequate assessment is needed of the pesticide inputs sector as to the respective roles and needs of the private and public sectors.

4. USAID could take active part in assisting Tanzania to identifying alternate use or means of disposal of pesticide stocks.

Although accurate inventory is not available, it is believed that Tanzania has significant quantities of obsolete pesticides (Section. 6.3.1). Although hard facts were not available during preparation of this document, the author of this SEA has gathered from various sources that substantial amounts of leftover stocks of unusable (mostly obsolete) pesticides that need to be disposed immediately probably exist in major agricultural regions, particularly in cotton and coffee growing areas around the country. Moreover, for other stocks that are not currently used for the intended purposes and are anticipated to remain stocked for some time, alternative ways in which they could be put to profitable use should be identified.

5. FAO should establish a system for the inventory of manpower, procedures and equipment.

This recommendation holds to the extent that FAO and other regional organizations (such as DLCO/EA and IRLCO/CSA) relevant to migrant pest control can be involved in strengthening Tanzania's MPCU, in collaboration with other sister agencies.

MITIGATION OF NON-TARGET PESTICIDE EFFECTS APPLICATION OF PESTICIDES

6. Pesticide should not be applied in environmentally fragile areas and human settlements.

Any future donations of pesticides for emergency use should be accompanied by an Action (Operations) Plan which specifies that use in protected and other sensitive areas is not allowed, and limiting use in others or requiring appropriate buffer zones. National Environmental Regulations should address protection of fragile habitats, including aquatic ecosystems -- estuarine, freshwater lakes, and riverines from pesticide applications. Protected areas should be surrounded by a pesticide-free buffer zone to avoid accidental pesticide contamination (e.g., spray drift). Normally, 2.0 km wide buffer zones are recommended for aerial spraying near protected area where wind-driven drift is likely. However, it may be more practical and reasonable to reduce the buffer zones to 500 meters wide or less under still-air conditions. Targeted ground-based application does not require large buffer zones. Under such circumstances, leaving 100 to 200 meters wide untreated areas may be adequate to warrant the level of desired protection. These areas include such as NPs, GRs, CGRs, lake regions, water courses,

estuarine and coastal regions. Any program funded by USAID involving pesticide use for the control of l/g and or aw should follow applicable Tanzania regulations concerning the protection of designated areas. This SEA supports the commitment to protect the natural environment, and emphasizes the importance of observing such directives in the use of pesticides accordingly.

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

This SEA stresses pesticide procedures that will tend to minimize use and mitigate adverse impacts; the nine pesticides identified in this SEA are the only ones sanctioned thus far by USAID, although FAO and others may endorse the use of others. Research results are likely to identify more environmentally safe pesticides and procedures for the future. USAID/Tanzania may wish to encourage research in Tanzania in the area of biological control, including exploration for indigenous strains of natural enemies of locusts and grasshoppers. Also, investigations are encouraged to identify and evaluate alternative and traditional control methods which could be made more broadly available.

8. Pre- and post-treatment monitoring and sampling of protected organisms and water and/or soils should be carried out as an integral part of the control campaign.

Any control campaign needs to establish whether a treatment has been effective. For major emergency campaigns, pre- and post-sampling is especially important. Special monitoring is important both as a basis for design of effective control operations as a means of establishing statistically verifiable baseline data. In addition, periodic "sampling" observations of gross mortality, populations and behavior should be made at locations of major use of pesticides. The results of ecotoxicological research on locust control chemicals in Morocco and Senegal are becoming available. For example, preliminary results of recent studies in Senegal (FAO's LOCUSTOX project) indicate that some impacts occurred at twice the recommended rate but little impact occurred at the recommended rate of application of the most environmentally detrimental pesticides, routine environmental monitoring of every use by individual farmers is not considered essential. Increased training to prevent excessive use is considered essential, however.

APPLICATION OF INSECTICIDES

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

This could be achieved through a number of operational procedures, including: (1) intensive surveillance to allow preventive, early treatment only when economic threshold is approached, or postponing treatment until densities, damage potential, or gregarization occurs, as the case may be; (2) providing training in how to recognize and define target treatment areas, and educate decision-makers on the importance of reduced use

of pesticides; (3) evaluation of effectiveness of treatments to help refine future intervention decisions; (4) identifying areas that should not be treated, or should receive minimum treatment (protected areas, wetlands, etc.) to ensure exclusion of such areas from pesticide treatment; (5) in cases where the decision not to conduct spraying leads to substantial crop loss in a given area, some type of compensation should be given to the affected population.

10. Helicopters should only be used when determined critical for survey to support ground and air control units.

When aerial treatment by helicopter is indicated, it should only be when very accurate spraying is necessary, such as close to environmentally fragile areas or for localized treatment. Helicopters are also useful for pre-treatment surveys and to pinpoint treatment sites. Ground application is the preferred modality in most cases.

11. Whenever possible, small planes should be favored over medium to large two or four engine transport types {for application of pesticides}.

In all cases, experienced contractors should be used. Any treatment program in Tanzania should continue to emphasize ground application. In as much as possible, thorough pre-treatment assessment and planning should be done to avoid contact with fragile habitats, such as national parks and game reserves.

12. Any USG-funded l/g and aw control actions which provide pesticides and other commodities, or aerial or ground application services, should include the necessary technical assistance as an integral component of the assistance package.

Significant locust, grasshopper, and armyworm emergencies in Tanzania will, for the foreseeable future, probably require assistance to help farmers avoid catastrophic losses. Any USG assistance is likely to involve regional l/g and aw organizations, the NGO/PVO community, in addition to the various regional locust control organizations, working with the PPD. Specific areas of T.A. particularly for environmental assessment and mitigation may likely be required until such time that long-term national capacity is adequate (See also Recommendations 27 and 30.)

13. All pesticide containers need to be appropriately labeled.

The PPD, in collaboration with TPRI and other appropriate bodies, including MOH, NCL, TOHS, and NGOs/PVOs, should emphasize and monitor enforcement of the appropriate section or sections of the current pesticide regulation that deals with this issue.

GROUP III: HIGH PRIORITY, TO BE IMPLEMENTED AS SOON AS
RESOURCES CAN BE ALLOCATED DISPOSAL OF PESTICIDES

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.

Tanzania currently appears to have significant stocks of obsolete pesticides (see Section 6.3. and REC. # 4) and there is a potential problem in the country that is likely to result from the use of empty pesticide containers for food stuffs, water, etc. It is encouraging to know that USAID is involved in the disposal activities of obsolete pesticides from Zanzibar. This SEA commends these activities. As a short-term plan, USAID/Tanzania could encourage the MOA and the PPD to survey and monitor obsolete stocks and search for options for disposal or at least mitigate the hazards they pose, preferably by transporting these products to designated centers for appropriate disposal later.

PUBLIC HEALTH AWARENESS

15. USAID should support the design, reproduction and presentation of public education materials on pesticide safety (e.g., TV, radio, posters, booklets).

This would include such subjects as safely using effective pesticides, ecology, management of l/g and aw and the hazards of pesticides. The goal would be to help policy makers and local populations recognize potential health problems related to pesticide applications. Collaborative activities among MOA, MOH, and TPRI should be initiated and supported in educating the public through posters and leaflets and by providing pesticide guidelines, and other related activities; capacities of these agencies could be enhanced (See Section 7.1).

Also, emphasis should be placed on safety training among private suppliers of pesticides. Tanzania also needs to strengthen national pesticide organizations, and should work with the private sector to ensure the correct use of imported pesticides.

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

The collaboration mentioned in Rec. 15 should be extended to the training of the pesticide applicators. USAID/Tanzania should promote and encourage collaborative activities of the MOH/MOH and MOA/PPD to provide health staff and others who are likely to handle pesticides with the necessary technical knowledge and training to address these issues.

17. Health centers and dispensaries located in an area where pesticide poisonings are expected to occur should be supplied with materials to diagnose and treat specific poisonings.

The village/district level dispensaries should be provided, prior to spraying, with printed materials, training, and with those medicines and antidotes required for treatment of pesticide poisoning cases. PVOs also should be equipped with small kits with antidotes, and should prominently post telephone numbers for the nearest medical help.

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.

This SEA supports the need for well-targeted monitoring of human health impact of pesticide applications. A EQM OP Kit (currently used by TPRI) and Lovibond test kit for an initial 1,000 samples can be obtained and used for monitoring the individuals most exposed to organophosphate pesticides. Monitoring pesticide impacts on human health could be incorporated into the study programs of the public health students. This SEA also encourages monitoring for actual symptoms of pesticide exposure, and environmental residues after pesticide applications.

PESTICIDE MANAGEMENT

19. The specifications for USAID-assisted acquisition of l/g and aw insecticides could be adapted for all insecticides.

Such specifications should be adapted and used in conjunction with this SEA. This would be part of the package for any pesticide related assistance that may be contemplated by USAID/Tanzania.

20. Pesticide container specifications should be developed.

This is an USAID/W activity which should be implemented through EPA Pesticide Disposal Guidelines and USAID's *Pest Management Guidelines* and Pesticide Procurement guidance, consistent with FAO, WHO and OECD guidance. Any changes in EPA's container regulations that are relevant to USAID should be incorporated into the current guidelines. Tanzania's pesticide regulation does provide specifications for pesticide containers consistent with FAO guidelines. Its implementation should be enforced.

BIOLOGICAL CONTROL

21. Biological control agents (e.g., insect pathogens and parasites) should be field-tested under Tanzania's conditions.

Studies in the area of biological control should be conducted, particularly in line with the search for indigenous strains of biological control agents for l/g and aw, including entomopathogens (such as fungi, microsporidia, virus, and bacteria), parasites, parasitoids, and predators. The use of insect pathogens isolated elsewhere (e.g., Madagascar strains) for use against l/g or aw may also be tested following good laboratory and quarantine procedures, to mitigate any unforeseeable negative impacts such organisms may

pose. It should be noted that the PPD is currently undertaking biological control research on cassava mealybug and other pests by importing parasitic insects. This should be encouraged and extended to include l/g and aw. Montana State University (in collaboration with Mycotech Corporation) through funding from AELGA Project and USAID Missions in Mali and Madagascar, IITA/IIBC, and to a certain extent, the International Center of Insect Physiology and Ecology (ICIPE), have been involved in l/g biopesticide research and development, and this should to be extended to cover Tanzania.

TRAINING/HUMAN RESOURCES

22. A comprehensive training program should be developed for NGO, PVO, and USAID staff should there be USAID Mission personnel who have responsibility for emergency pest control such as l/g and aw control operations. This should take advantage of existing materials and those under development, in order to save resources.

The Operations Handbook (USAID, 1989a) fills this need in part, and this SEA encourages Mission should keep close contact with the AELGA project, Africa Bureau, and also with other Missions and REDSO/ESA who may have the expertise to address this issue. In addition, reference can be made to USAID's Pest and Pesticide Management Guidelines, as well as other documents such as the Pesticide Users' Guide -- Handbook for Extension Workers (Overholt & Castleton 1989), various FAO Guidelines, and GIFAP's Guidelines series.

23. Local programs of training need to be strengthened for pesticide storage management, environmental monitoring and public health.

This should be done collaboratively between TPRI, MOA/PPD, and MOH, as indicated under Rec. 15, 16 and 17. Furthermore, priority needs to be given to training to ensure the safe and appropriate handling and application of pesticide products, particularly for village/farmers and/or representatives. Also, extension agents' capacities to handle such problems should be enhanced.

24. When technical assistance teams are provided to host country they should be given short-term intensive technical training (including language if necessary) and some background in the use and availability of training aids.

Expatriate teams should always be associated with local personnel. Junior personnel should be paired with more experienced personnel. A preferred approach is to select technical assistance teams which have the best possible expertise, familiarity with the local situations, and sufficient language fluency for the tasks to be performed. To the extent that any member has a notable gap in language or facility with training aids, short-term training should be provided, but only as a last resort. If necessary, an interpreter will need to be provided, preferably from local sources.

ECONOMIC & COST-BENEFIT ASPECTS

25. Field research should be carried out to generate badly needed economic data on a country basis.

Ideally, rational control activities would be based on economic cost-benefit analyses and crop loss assessment, carried out in connection with food security assessments. In practice, economic data is difficult to come by expeditiously with available technologies and systems in time to inform real-time decision-making. This is an aspect which should be pursued as resources become available. See Rec. 26.

26. No pesticide should be applied unless a working action threshold for risk of damage by l/g or aw is exceeded.

While valid economic thresholds cannot be established at this time, ad hoc action thresholds can be developed based on objective analysis of population levels and trends, and crop loss assessments.

It is possible to collect semi-quantitative data to determine the extent to which agricultural productivity is threatened and an effort to ensure that declarations of disaster are supported by valid professional judgement. This would ensure minimum pesticide procurement by limiting USAID participation when a reasonable probability of substantial threat to crops does not exist.

GROUP IV: EQUALLY HIGH PRIORITY, BUT OF BROADER RELEVANCE TO OVERALL AGRICULTURAL AND ENVIRONMENTAL PROGRAMS ENVIRONMENTAL POLICY

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.

In African countries, USAID/W has worked with EPA to provide experts who are knowledgeable in all aspects of pesticide regulations and policies, including human safety, environmental impact, and use, storage, and disposal. It is expected that expanded interagency interactions will facilitate the implementation of this recommendation. USAID/W is also engaged in developing a follow-up mechanism to AELGA. Tanzania does have NEAP, pesticide regulations, and is in the process of developing National Environmental Policy. This being the case, USAID's involvement may be to help with the implementation and familiarizing decision makers, the private sector and the general public with these regulations.

PESTICIDE MANAGEMENT POLICY

28. A pesticide use inventory covering all treatments in l/g and aw should be developed. This is a matter appropriate for action in collaboration with the NGOs, PVOs, and the private sector.

USAID/Tanzania should explore with PPD as to how to improve the extent to which a comprehensive inventory is developed. Such a pesticide inventory program should prevent the build-up of obsolete stocks and contribute to a cost reduction in pesticide use in general.

PESTICIDE HANDBOOK

29. USAID should produce a regularly updated pesticide handbook for use by its staff [which would also be of use to NGOs/PVOs and host country pest management practitioners].

This is a centralized function being accomplished by USAID/W. Relevant activities in this area include the following examples: USAID Locust/Grasshopper Management Operations Guidebook (1989); USAID Pest Management Guidelines (1991). An updated list of USAID-approved anti-locust/grasshopper pesticides is presented in Appendix iii and a list of other relevant documents in Appendix II. Also, the Africa Bureau PVO/NGO Environmental Guidelines provide generic guidance on pesticide use. However, this SEA recommends the production of a Handbook containing health, safety, and environmental assessments of the pesticides in use. This type of information is less subject to change than use and application related data. Updating of the health and environmental safety information would only be necessary when new information becomes available, for example through EPA's Special Review process.

SUPPORT, TECHNICAL ASSISTANCE AND TRAINING

30. Appropriate technical assistance, education and training should be provided to potential participants in l/g and aw operation with a view to making migratory pest control activities eventually self-sustaining.

USAID/Tanzania policy is to help host countries to help themselves become self-sustaining. All activities in any USAID-supported l/g and aw control program in Tanzania should help build farmer-level capacity. GTZ is currently providing technical assistance and materials to strengthen the PPD, and this should be encouraged.

GROUP V: DESIRABLE BUT OF LESS URGENCY IN OUTBREAK SITUATIONS PROPER STORAGE

31. The need for more or improved pesticide storage facilities should be determined.

Regional pesticide bank(s) should be established in l/g and aw affected areas to ensure quick response should outbreaks occur (such as with the DLCO/EA and IRLCO/CSA). However, if existing stocks are determined to be inadequate, supplies should be built up at times when field observations indicate that a locust, grasshopper, or armyworm problem is imminent.

FORECASTING

32. USAID should fund forecasting and remote sensing (through FEWS) or utilize DLCO/EA's, IRLCO/CSA's and FAO's early warning program.

This SEA recognizes the difficulties inherent in providing for adequate early warning. USAID/W and FAO are pursuing initiatives in this matter, including application of geographical information systems and remote sensing to forecasting. Early warning and forecasting systems and greenness mapping could be of great help in the region. FEWS and the FAO Forecasting Unit could potentially play a role in this regard. The IRLCO/CSA and DLCO/EA may have relevant capacity which could be supported.

PUBLIC HEALTH MONITORING AND STUDY

33. In areas of heavy human exposure to pesticides for locust, grasshopper, and armyworm control, epidemiological case-control studies should be implemented.

The PEA argues for such epidemiological case-control studies where the conditions justify them, viz., situations of long-term, widespread heavy pesticide use where well-developed public health monitoring facilities exist. These conditions should be verified for Tanzania in order to determine the relevance of this recommendation.

34. Applied research should be carried out on the efficacy of various pesticides and growth retardants and their application.

TPRI, Sokoine University of Agricultural, PPD and National Agricultural Research Centers (NARC) are in a position to explore potential alternative l/g and aw control tactics including insect growth regulators (IGRs) and local strains of biological control agents that can be used in l/g and aw control programs.

35. Applied research should be carried out on the use promising of botanical pest control agents as anti-feedants and pesticides.

Although neem is a promising botanical pesticide, anti-feedant and insect growth regulator, it is not likely to be locally available soon as a viable pest control alternative. Research on botanical pesticides should be pursued to determine their applicability to Tanzania's specific conditions.

36. Research should be carried out to determine the best techniques for assessing the impacts of organophosphates used for locust and grasshopper control with respect to the use of these and other chemicals for other pest control programs.

Local ecotoxicological data on these insecticides should be developed, and used with the results of similar works elsewhere (such as FAO's LOCUSTOX project in Senegal) to mitigate the pesticides' environmental impacts. Deleterious interactions with

other pesticides are also possible. For example, the potential exists for helping to induce insecticide (particularly pyrethroid) resistance in malaria mosquitoes in areas where locust insecticides are applied.

GROUP VI. FINAL RECOMMENDATIONS ON PROCEDURES TO FACILITATE AND ACCELERATE IMPLEMENTATION OF RECOMMENDATIONS 1-36

37. USAID, on the basis of the previous recommendations, should ensure that an Action Plan is developed, with practical procedures to provide operations guidance in locust grasshopper control to Missions in the field.

USAID/W has developed a comprehensive Locust/Grasshopper Management Operations Guidebook (USAID 1989), and, mostly under the AELGA project, developed Supplementary Environmental Assessments in countries that are most critical for locust and grasshopper control (see Sect. 2.1). These SEAs contain commitments for future actions. Country-specific plans of action will be developed to implement those commitments when needed. The country specific plans of action will be essential guidance for l/g and aw control activities. USAID/W will work closely with USAID/Tanzania in the development of plans of action as requested.

38. USAID should promote common approaches to l/g and aw (as applicable) control and safe pesticide use among UN Agencies and donor nations. The Tanzania MOA/PPD should be used to promote local coordination.

Coordination of efforts will become increasingly important because of the potential for increasing number and magnitude of multilateral agreements and follow-up efforts by various donors. For this specific task, PPD should be the primary coordinating body working in close collaboration with the regional organizations although donors also discuss specific plans with each other. These efforts should be improved for the future and international organizations such as the FAO should be encouraged to play active role.

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APPENDICES

Appendix I. List of persons contacted and interviewed.

GOVERNMENT OF TANZANIA

Dr. Albert Mushi, Asst. Commissioner, PPD
Mrs. Francisca Ketagira, Senior Plant Pathologist, PPD
Mr. Geoffrey Kiranga, Plant Protection Officer, PPD
Mr. R.S.K. Chomba, Senior Locust Specialist, PPD
Dr. Ernest G. Masha, Coordinator, Tengeru Pest Control Services
Mrs. Adela Moshi, Pathologist, Arusha, RPPD
Mr. Gaspar Mallya, Armyworm Coordinator, Tengeru, Arusha
Mr. Wilfred Mushobozi, Armyworm Forecaster, Tengeru, Arusha
Mr. Mike Ngalla, DLCO, Arusha Operation Base Manager
Dr. David Maeda, Toxicologist, TPRI, Arusha
Dr. Bema Uronu, Entomologist, Head, Agricultural Research, TPRI
Mr. James A. Saidi, Senior Entomologist, Agricultural Research, TPRI
Mr. Henry Lyatuu, Head Pesticide Registration and Control, TPRI
Dr. Peter Barie, Head RALDO, Arusha
Dr. Eric K. Mugurual, Director for the Department of Environment, MTNRE
Mr. Muhidin A. Ndolango, Director, Wildlife Division, MTNRE

SOKOINE UNIVERSITY OF AGRICULTURE

Dr. Ludovick D. B. Kinabo, Research Director
Prof. Allan F. Lana, PPI, Dept. of Agriculture
Dr. R. B. Mabagala, Senior Entomologist
Prof. Ali, Dean, Faculty of Forestry
Dr. Robert Machanga, Head, Rodent Research Unit
Dr. Thomas Imbise, Senior Researcher, Rodent Research Unit
Mr. Wigambuya, Acting Director, Library

USAID/TANZANIA

Mr. Pat. Fleuret, PDO
Mr. Tom Bilecky, EXO
Mr. Kristos Minja, PDO
Mr. Joel Strauss, FFP
Mr. Herment Mrema, PDO

NGO/PVO

Dr. L. B. Mlingi, Director General, TOSH

Private companies

Mr. Michael Rut, Agricultural and Industrial Chemicals Services

FAO

Mr. Shahid Najam, Deputy Rep. in Tanzania

OTHER INTERNATIONAL DONORS

GTZ

Dr. Christian Pantenius

AID/WASHINGTON

John G. Gaudet, Ph.D., Bureau Environmental Officer, AFR/SD
Allan T. Showler, Ph.D., Entomologist, AFR/AA/DRC - Technical
Advisor to the AELGA Project
Walter Knausenberger, Ph.D., Environmental Advisor, AFR/SD/PSGE

PREPARER:

Yeneneh T. Belayneh, Ph.D., Ecotoxicologist, Assistant Technical
Advisor, USAID/AA/AFR/DRC-AELGA Project

Appendix II.

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
AFRICA BUREAU
Office of Sustainable Development
Division of Productive Sector Growth and the Environment
AFR/SD/PSGE
Washington, D.C. 20523-0089

MEMORANDUM

August 9, 1994

TO: Paul Novick, AA/AFR/DRC
Director

FROM: John Gaudet, AFR/SD/PSGE,
Bureau Environmental Coordinator

SUBJ.: Amendment of the Supplemental Environmental Assessments
for Locust/Grasshopper Control to allow African
armyworms to be dealt with in East Africa

Recent food-security threatening outbreaks have occurred of the African armyworm in the greater Horn of Africa, engendering numerous inquiries concerning USAID options for intervention, including the potential use of pesticides (summarized in State 184163 and Addis 005391). This office has been asked to determine options for USAID intervention in a manner consistent with its Environmental Procedures ("Reg. 16"), specifically the provisions of the pesticide procedures outlined in 22 CFR 216.3(b)(1).

In view of the fact that the 1994 outbreak in the Horn is well along already, thus will soon have run its course for this growing season, and that pesticide-related assistance cannot be rendered before an appropriate environmental assessment has been conducted, it is unlikely that USAID still will be able to respond this year in a manner which invokes pesticide use, directly or indirectly. Nevertheless, it is desirable that expedited measures be taken to provide for this facility as soon as possible for future armyworm outbreaks.

Two key facts are pertinent in this connection:

1. USAID/AFR's regional AELGA project, established to address short-term and medium-term responses to locust and grasshopper outbreaks, already has a mandate to consider responses to "other emergencies" of a pest-related nature.
2. An overarching environmental assessment concerning locust/grasshopper control operations, the "Programmatic Environmental Assessment for Locust and Grasshopper Control

in Africa/Asia" (PEA), already provides the context for rational pesticide use, and lays out measures to mitigate potential negative impacts. Over 20 country-specific Supplemental Environmental Assessments (SEAs) have been prepared, including Ethiopia, Eritrea and for the Desert Locust Control Organization of East Africa (DLCO-EA) operations in Somalia (DLCO has a mandate for armyworm control).

The SEAs contain country-specific environmental information and provide guidance on environmentally sound management procedures for pesticide use in a particular country, guidance which to a large extent is directly pertinent to the considerations which would apply in control decisions for armyworms. Given that African armyworms are mass migrating insects with cyclical population dynamics, and will very likely require intervention over a large geographic area to protect vulnerable crops in drought-prone regions in the future, the interventions required are very analogous to those necessitated by locusts. While a definite differentiation needs to be made between control measures for locust/grasshoppers as opposed to armyworms, clearly, there are also distinct benefits and economies to be gained by minimizing the need to re-visit pesticide management, safe use, environmental health and related issues which apply both to armyworm and locust/grasshopper control.

Environmental assessments may be amended whenever a new need arises and/or valuable information that can be utilized in the process of implementing sound programs becomes available and when such information necessitates an update. Thus, four options for dealing with the requirement to prepare an environmental assessment were considered, from more generic to more limited in scope:

1. Design and carry out a new PEA to address the broader array of pest outbreak emergencies in as preventive a way as possible, but with a more limited geographic scope, including at least an updated treatment of locusts and grasshoppers, as well as rodents and armyworms in sub-Saharan Africa. This option, while desirable in the long-term, would require considerable time and resources, and would not be consistent with an expedited response. Subsequent SEAs would be needed as well.
2. Conduct an amendment to the existing locust/grasshopper PEA to address the specific situation with armyworms in Africa. Then conduct separate country-specific SEA amendments for each country where needed.
3. Carry out separate amendments to the existing Eritrea and Ethiopia SEAs to address the armyworm situation in those countries only. These Amendments would include enough information (e.g., from the PEA and SEAs) to be complete, self-standing documents.

✓
i.e., self-explanatory

4. Delink the armyworm issue from the present PEA and SEAs, and take an independent course following Reg. 16 in connection with a specific planned intervention for armyworms, i.e., do an initial environmental examination, and prepare an independent environmental assessment (which nevertheless will be informed by and based on the PEA and SEAs). This option does not take advantage of economies to be gained by linking the process to the PEA/SEAs.

Determination:

Option 3 is an appropriate and well-circumscribed approach, and consistent with USAID Environmental Procedures and good practice. It will allow immediate steps to be taken to ensure that practical and effective assistance can be rendered if needed, while mitigating and preventing to the fullest extent possible any negative consequences due to pesticide use. The amendments should emphasize, for armyworms even more than for locusts, alternatives to chemical pesticides, as part of an IPM program. All the normal considerations which apply to SEAs per se also pertain to the amendments, for example with respect to scoping and coordination with other donors and the host country government(s), the NGO/PVO community and regional pest management organizations such as the DLCO-EFA.

Once intervention is imminent in a given country, the amended SEAs should be linked to a Plan of Action developed by the host country government, FAO and/or NGOs as appropriate, before USG assistance in the matter of armyworm is rendered.

Clearance:

GC, STisa SMY
PPC, JHester JH

Date: 8/5/94
Date: 8/8/94

Distribution:

AA/AFR/DRCO/AELGA, AShowler
FHR/OFDA
AFR/EA, JPryor
USAID/REDSO/ANR, JFlynn
G/EG/AFS, RHedlund
USAID/Addis Ababa,
USAID/Asmara,

Draft: WIKnausenberger, AFR/SD/PSGE, 1-VIII-94

Appendix III. Documentation that can be consulted on safety measures, transport, distribution, handling, selection, use, application, storage, and disposal of pesticides.

Pesticide Management Documents:

1. Crop Protection Service Organization (D.310) T. 1. PRIFAS. Dec. 1988.
2. Effectiveness of Localized Pesticide Treatment. (D.309) T. 2. PRIFAS - Dec. 1988.
3. Effects of Locust/Grasshopper and Control on the Environment. (D. 308) T. 3. PRIFAS - Dec. 1988.
4. First Aid in cases of Poisoning by Locust/ Grasshopper and Control Products. CIBA-GEIGY.
5. Formulation of Pesticides in Developing countries. UNIDO, New York. 1983.
6. Guidelines on the Disposal of Waste Pesticides and Disposal of Containers on the Farm. FAO, Rome. 1985.
7. Guidelines on Good Labelling Practices for Pesticides. FAO, Rome. 1985.
8. Guidelines on Good Practices for Ground and Aerial Application of Pesticides. FAO, Rome. 1988.
9. Guidelines for Legislation on the Control of Pesticides. FAO, Rome. 1989.
10. Guidelines on Post-Registration Surveillance and Other Activities in the Field of Pesticides. FAO, Rome. 1988.
11. Guidelines for the Packaging and Storage of Pesticides. FAO, Rome. 1985.
12. Guidelines for Quality Control of Pesticides. GIFAP, Brussels. 1985.
13. Guidelines for the Registration and Control of Pesticides. FAO, Rome. 1988.
14. Guidelines on Retail Distribution of Pesticides with Particular Reference to Storage and Handling at the Point of Supply to Users in Developing Countries. FAO, Rome. 1988.
15. Guidelines for Selection, Procurement, and Use of Pesticides in World Bank-Financed Projects. World Bank, Washington, D.C. 1994.

16. International Code of Conduct for Distribution and Utilization of Pesticides (Amended Version). FAO,
17. Insecticide Poisoning: Prevention, Diagnosis and Treatment.
18. Locust/Grasshopper and Control - Inter-ministerial Instruction No. 3 Related to Protection of Man and Environment. Algérien doc.- March 1989.
19. Options for Insuring Quality in Stored Pesticide Products, Technical Monograph No. 10. GIFAP, Brussels, 1985.
20. Tanzania's Pesticide Control Regulation (Appendix XI)

USEPA Pesticide Fact Sheets:

Acephate	# 140	October	1987
Bendiocarb	# 195	June	1987
Carbaryl	# 21	March	1984
Chlorpyrifos	# 37	September	1984
Diazinon	# 96.1	December	1988
Fenitrothion	# 142	July	1987
Malathion	# 152	January	1987

These are among the many Pesticide Fact Sheets issued by the U.S. Environmental Protection Agency, selected for relevance to locust/grasshopper and control. They summarize data known to EPA at the time of preparation of the Fact Sheet. They generally include information on acute and chronic toxicity to humans and other non-target organisms, handling precautions, and other instructions for use. They may be requested from:

Office of Pesticide Programs
 U.S. Environmental Protection Agency
 401 M Street, SW
 Washington, D.C. 20460 USA

Appendix IV. List of USAID-approved pesticides for locust/grasshopper control.

(Copy of 1993 cable State 118760)

UNCLASSIFIED

CLEAR: ()

CLEAR: ()

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

CLEAR: ()

CLEAR: ()

AID/AFR/ONI/TPPI:VDREYER(DRAFT) AID/AFR/ONI/TPPI:ASHOWLER(DRAFT)
AID/NE:GJACKSON(DRAFT) AID/POL:JHESTER(DRAFT)
AID/AFR/ARTS:JGAUDET(DRAFT) AID/AFR/FHA/OFDA:GHUDEN(DRAFT)
AID/GC/AFR:ESPRIGGS(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

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	MAHML	BIOAC	PERS	SIGNW
1. ACEPHATE	L	L	L	M	L	L	C
2. BENDIACARB	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, MAHMLS

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)

SPECIFIC DOSAGES MUST BE WORKED OUT BY HIGHLY EXPERIENCED PERSONNEL FAMILIAR WITH THE APPLICATION EQUIPMENT, PESTICIDE FORMULATION, ETC., TO BE USED. FOR ELABORATION ON THE PROPERTIES OF A.I.D.-APPROVED ANTI-LOCUST/

UNCLASSIFIED

3

GRASSHOPPER PESTICIDES, CONSULT THE PEA AND COUNTRY-SPECIFIC SUPPLEMENTARY ENVIRONMENTAL ASSESSMENTS (SEAS).

3. IT IS IMPORTANT THAT ALL PRECAUTIONS INDICATED ON THE PESTICIDE LABELS, E.G., APPLICATION DOSAGES, SAFETY MEASURES, INSTRUCTIONS ON HANDLING AND STORAGE PROCEDURES, DISPOSAL OPTIONS, ENTRY BY UNPROTECTED PERSONS INTO TREATED AREAS, EMERGENCY GUIDELINES, ETC., BE CAREFULLY OBSERVED, AS OUTLINED IN THE COUNTRY-SPECIFIC SEAS.

4. AID/W WILL KEEP MISSIONS INFORMED OF FUTURE UPDATES ON THE LIST OF A.I.D.-APPROVED ANTI-LOCUST/GRASSHOPPER PESTICIDES. 44

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ADDITIONAL CLEARANCES:

AID/AFR/EA:PGUEDET{INFO}
AID/AFR/CCWA:HGOLDEN{INFO}
AID/AFR/SWA:JGILMORE{INFO}
AID/AFR/SA:KBROWN{INFO}
AID/AFR/ARTS/FARA:WKNAUSENBERGER{DRAFT}
AID/RD/AGI:RHEDLUND{INFO}

Appendix V. Areas under crop production ('000 ha) (a) and yield/ha ('000 metric tonnes) for principal crops in Tanzania for the 1985/86 to 1991/92 cropping seasons.

(a)

CHAPTER V

AREA & PRODUCTION ESTIMATES

Table 5.1 AREA, PRODUCTION AND YIELD PER HECTARE OF PRINCIPAL CROPS

TANZANIA MAINLAND

AREA ('000 HECTARES)

CROP / YEAR	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
CEREALS							
Maize	1576.28	1484.19	1674.70	1668.95	1631.26	1848.30	1908.16
Sorghum **	445.88	409.19	492.23	476.70	486.96	858.30	683.07
Millet **	345.61	300.92	311.90	274.91	145.46	N.A.	308.58
Paddy	265.66	315.03	409.12	385.31	289.29	368.70	306.57
Wheat	43.45	55.76	60.83	57.85	52.01	50.30	43.79
Cassava	665.53	639.26	756.44	734.76	590.21	604.20	683.71
Sweet Potatoes	97.17	183.68	180.65	198.54	306.54	232.00	197.68
Pulses	595.59	328.10	581.02	525.94	579.52	564.70	594.76
Bananas/Plantains	262.00	266.00	270.85	N.A.	225.98	252.20	264.57
FIBRES							
Cotton	456.90	486.07	418.07	353.83	389.34	504.29	564.73
Sisal	51.53	43.08	41.52	42.52	78.23	77.91	77.97
OTHER CASH CROPS							
Coffee	254.24	254.24	257.73	256.20	242.06	242.06	242.06
Tea	9.18	12.64	12.57	12.57	12.57	12.57	19.36
Tobacco	18.91	21.10	26.29	20.52	22.84	20.58	31.50
Pyrethrum	7.50	8.00	8.00	8.00	8.00	8.00	7.78
Cashewnuts ***	N.A.						

Note: N.A. Not available

** Data for sorghum in 1989/90 & 1990/91 include Millet

*** Area figures for Cashewnuts are not available

(b)

Table 5.2

AREA, PRODUCTION AND YIELD PER HECTARE OF PRINCIPAL CROPS

TANZANIA MAINLAND

PRODUCTION ('000 METRIC TONS)

CROP / YEAR	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
CEREALS							
Maize	2670.77	2244.53	2423.33	2528.05	2227.38	2331.80	2226.42
Sorghum **	383.64	363.05	423.51	409.66	537.15	750.20	587.13
Millet **	300.87	250.17	199.02	217.20	NA	NA	262.78
Paddy	417.80	510.77	782.30	767.16	735.99	405.70	392.22
Wheat	97.90	71.58	75.24	81.31	105.85	83.70	64.00
Cassava	1533.56	1124.66	1399.20	1271.94	1730.61	1566.40	1777.65
Sweet Potatoes	177.35	335.86	319.18	337.31	996.07	290.80	256.99
Pulses	432.11	251.35	379.20	385.31	384.38	424.60	311.78
Bananas/Plantains	777.00	792.30	792.30	N.A.	823.20	750.00	793.70
FIBRES							
Cotton	152.66	231.28	222.15	207.58	178.97	254.94	247.24
Sisal	32.84	30.15	33.17	33.28	32.26	33.74	36.00
OTHER CASH CROPS							
Coffee	54.77	41.00	45.51	48.80	53.42	46.21	56.03
Tea	15.54	14.11	15.89	15.99	24.71	21.88	19.53
Tobacco	12.55	16.47	12.92	11.56	11.06	11.81	16.45
Pyrethrum	1.35	1.23	1.41	1.31	1.59	1.68	2.22
Cashewnuts	19.20	18.49	22.47	19.26	17.06	29.85	40.15

Note: N.A. = Not available

* Provisional

** Data for sorghum in 1989/90 & 1990/91 include Millet

Appendix VI. Areas under traditional and modern irrigation schemes (ha) between 1991 and 1992.

Table 2.4 REGIONAL AREAS UNDER IRRIGATION (Ha)

REGION\YEARS	1990/91 - 1991/92					
	TRADITIONAL IRRIGATION		MODERN IRRIGATION		TOTAL AREA UNDER IRRIGATION	
	1990/91	1991/92	1990/91	1991/92	1990/91	1991/92
Arusha	8,994	4,520	0	0	8,994	4,520
Coast	43	687	28	24	71	711
Dsm	**	71	**	49	0	120
Dodoma	1,034	484	1,070	1,079	2,104	1,563
Iringa	2,434	688	80	80	2,514	768
Kagera	0	0	142	122	142	122
Kigoma	941	618	0	40	941	658
Kilimanjaro	**	4,260	**	3,160	0	7,420
Lindi	**	425	**	0	0	425
Mara	1,580	1,620	363	203	1,943	1,823
Mbeya	5,930	2,130	4,322	4,322	10,252	6,452
Morogoro	4,222	1,110	6,810	4,783	11,032	5,893
Mtwara	**	2,877	**	40	0	2,917
Mwanza	**	70	232	163	232	233
Rukwa	**	253	**	96	0	349
Ruvuma	19	**	0	0	19	0
Shinyanga	8,032	8,036	107	107	8,139	8,143
Singida	420	**	20	20	440	20
Tabora	2,537	1,312	487	472	3,024	1,784
Tanga	8,035	6,535	310	430	8,345	6,965
Total	44,221	35,696	13,971	15,190	58,192	50,886

Note: ** = Data not available at the time of compilation.

Source: Ministry of Agriculture

Appendix VII. Cattle production in Tanzania - 1986 - 1992.

REGION:	1984*	ESTIMATED CATTLE NUMBERS: 1986 TO 1992:								
		%CHANGE 1985-90	%CHANGE '91-2000	1986	1987	1988	1989	1990	1991	1992
ARUSHA	1,855.7	0	0	1,856	1,855.7	1,855.7	1,855.7	1,855.7	1,855.7	1,855.7
COAST	87.9	1.25	-0.975	90	91.0	92.0	93.0	93.9	95.1	95.4
DAR ES SALAAM	62	10	5.35	7	8.2	9.0	9.9	10.8	11.4	12.1
DODOMA	1,000.2	0.5	0.6	1,009	1,013.0	1,016.3	1,019.2	1,021.6	1,031.6	1,041.5
IRINGA	480.4	1.25	-0.975	482	497.5	502.9	508.1	513.1	520.1	527.0
KAGERA	364.4	4	2.35	394	409.0	424.6	440.6	457.0	469.6	482.3
KIGOMA	62.3	1.25	0.975	64	64.5	65.2	65.9	66.5	67.4	68.3
KILIMANJARO	410.1	1	0.85	418	421.5	425.0	428.3	431.5	436.8	442.1
LINDI	6.2	2.5	1.6	7	6.7	6.8	7.0	7.1	7.3	7.4
MARA	969.8	0	0	970	969.8	969.8	969.8	969.8	969.8	969.8
MBEYA	900.8	1.25	0.975	923	932.9	943.0	952.7	962.1	975.1	988.1
MOROGORO	332.7	2.5	1.6	349	357.4	365.8	374.1	382.4	390.0	397.7
MTWARA	15.0	4	-2.35	16	16.9	17.5	18.2	18.9	19.4	19.9
MWANZA	1,357.5	0	0	1,358	1,357.5	1,357.5	1,357.5	1,357.5	1,357.5	1,357.5
RUKWA	392.2	6	3.35	440	466.1	493.2	521.7	551.6	572.2	593.5
RUVUMA	39.0	2.5	1.6	41	41.9	42.9	43.9	44.8	45.7	46.6
SHINYANGA	1,890.2	0	0	1,890	1,890.2	1,890.2	1,890.2	1,890.2	1,890.2	1,890.2
SINGIDA	939.8	0	0	940	939.8	939.8	939.8	939.8	939.8	939.8
TABORA	928.8	0	0	929	928.8	928.8	928.8	928.8	928.8	928.8
TANGA	472.9	2.5	1.6	496	508.1	520.0	531.8	543.7	554.5	565.3
TOTAL	12,512.0	0.7	-0.7	12,687.8	12,776.6	12,866.1	12,956.1	13,046.8	13,138.2	13,230.1

* The actual 1984 Livestock Census.

Tables 12.1 to 12.6, the estimated figures were derived from observed regional growth rates for the period 1985 to 2000.

Regional estimates were based on regional assumptions e.g. off-take rates, potential growth rates, geographical locations of respective regions, etc.

Sources: Ministry of Agriculture (MOA).

Appendix VIII. Geographical distribution of populations of Tanzania.

CHAPTER I

MACRO ECONOMIC DATA

Table 1.1 POPULATION ESTIMATES BY REGIONS
Thousands

REGION /YEAR	1985	1986	1987	1988*	1989	1990
ARUSHA	1,183	1,227	1,274	1,321	1,368	1,298
COAST	578	589	600	611	622	665
D'SALAAM	1,394	1,496	1,605	1,723	1,849	1,498
DODOMA	1,171	1,204	1,239	1,274	1,312	1,298
IRINGA	1,100	1,131	1,167	1,193	1,225	1,276
KAGERA	1,298	1,349	1,397	1,451	1,505	1,399
KIGOMA	782	804	828	851	876	904
K'NJARO	1,093	1,125	1,159	1,193	1,227	1,158
LINDI	604	617	631	645	659	673
MARA	862	885	908	933	956	1,028
MBEYA	1,335	1,379	1,428	1,469	1,516	1,570
MOROGORO	1,134	1,167	1,202	1,237	1,272	1,288
MTWARA	878	897	916	934	954	915
MWANZA	1,736	1,787	1,836	1,889	1,944	1,978
RUKWA	603	629	656	684	713	758
RUVUMA	691	713	725	758	782	838
SHINYANGA	1,662	1,719	1,779	1,839	1,902	1,878
SINGIDA	730	750	770	791	812	832
TABORA	1,089	1,136	1,185	1,236	1,288	1,087
TANGA	1,236	1,270	1,305	1,340	1,377	1,339
TOTAL	21,159	21,874	22,610	23,372	24,159	23,680
Rural	17,539	17,997	18,460	18,929	19,404	19,885
Urban	3,620	3,877	4,151	4,443	4,755	5,087

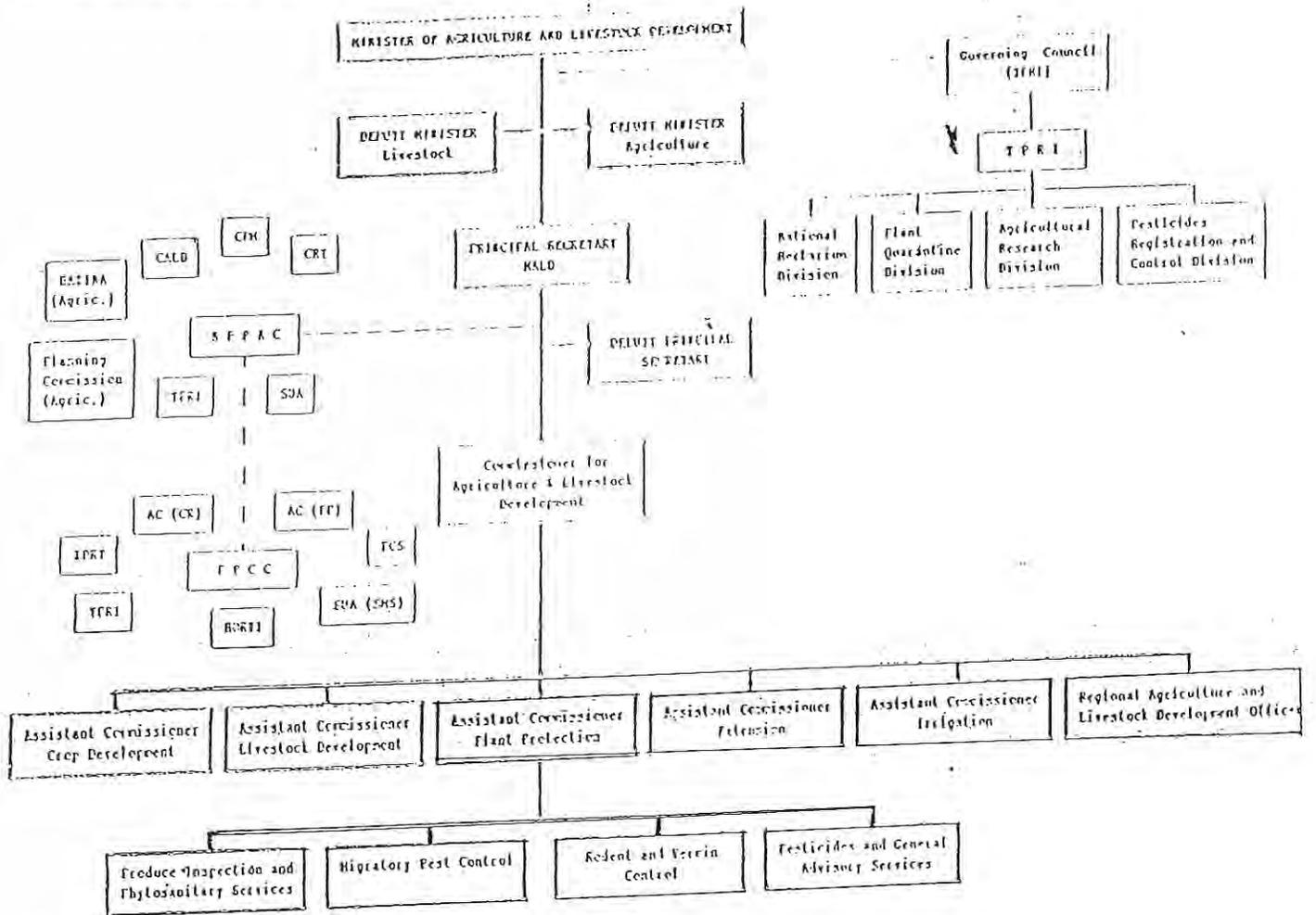
Notes:

* Population Census.

Source: Central Bureau of Statistics,
Quarterly Statistical Bulletin.

Appendix IX. Organogram of the Ministry of Agriculture and the Department of Plant Protection of Tanzania.

9.5.1 THE STRUCTURE OF MPD AND RELATED BODIES



KEY

- The existing organisational structure (partial) of the Ministry of Agriculture showing only the Plant Protection Division.
- Tropical Festicides Research Institute, operating as a parastatal by now.
- AFFAC — National Plant Protection Advisory Committee (Executive) } Proposed to be reinstated
- FPCC — Plant Protection Coordinating Committee (Technical)

Respective members to the Committees:

APFAC (Executive Committee):

- 1) CSLO (Commissioner for Agriculture and Livestock Development)
- 2) CIM (Commissioner for Planning and Marketing)
- 3) CRT (Commissioner for Research and Training)
- 4) SUA (Sokoine University of Agriculture)
- 5) ES/IMA (Ministry of Finance representative - Agriculture Section)
- 6) Planning Commission (President's Office: Planning representative - Agriculture Section)
- 7) TFR I (Tropical Festicides Research Institute)

MPD (Technical Committee):

- 1) AC (CR) - Assistant Commissioner for Crop Research
- 2) IPRT - Joint Director for Research and Training
- 3) AC (TF) - Assistant Commissioner for Plant Protection
- 4) TFR I - Tropical Festicides Research Institute
- 5) FCS - Pest Control Services
- 6) SUA - Sokoine University of Agriculture - SWS
- 7) BORT I - Boticultural Institutes

THE TROPICAL PESTICIDES RESEARCH INSTITUTE

ACT, 1979

ARRANGEMENT OF SECTIONS

Section

Title

PART I

PRELIMINARY

1. Short title and commencement.
2. Interpretation.

PART II

THE TROPICAL PESTICIDES RESEARCH INSTITUTE

3. Establishment of the Institute.
4. Functions of the Institute.
5. Vesting of the East African Tropical Pesticides Research Institute and the East African Pesticides Control Organization and provisions relating to land.

PART III

ADMINISTRATION

6. The Council of the Institute.
7. Powers and duties of the Council.
8. Director of the Institute.

PART IV

RESEARCH OPERATIONS OF THE INSTITUTE

9. Research Committees and provisions relating to research.
10. Information on pesticides research to be furnished to the Institute.
11. Institute may call information on pesticides research.
12. Provisions relating to discoveries.
13. Pesticides Approval and Registration Technical Committees;
14. Programmes of the Institute.

PART V

PESTICIDES CONTROL

15. Register of Pesticides.
16. Applications for registration of pesticides and cancellation of registration.
17. Appeals.
18. Publication in the *Gazette* of list of pesticides.
19. Manufacture, importation, sale, etc., of unregistered pesticides and offences.
20. Labelling of registered pesticides.

- | <i>Section</i> | <i>Title</i> |
|----------------|--|
| 21. | Appointment and powers of inspectors and analysts. |
| 22. | Obstruction. |
| 23. | Taking submission of sample for analysis. |
| 24. | Division and analysis of samples. |
| 25. | Giving false information, etc, in connection with manufacture, importation or sale of pesticides and offences. |
| 26. | Unlawful disclosure of information and offences. |
| 27. | Disclosure of information by the Institute. |
| 28. | Power of court to make orders. |
| 29. | Evidence. |
| 30. | Criminal liability of bodies corporate and their officers. |

PART VI

FINANCIAL PROVISIONS

31. Funds and resources of the Institute.
32. Annual and supplementary budget.
33. Investment.
34. Power to borrow.
35. Accounts and audit.
36. Annual statement of accounts and report to be submitted to the Minister.
37. Annual statement and report to be laid before the National Assembly.

PART VII

MISCELLANEOUS PROVISIONS

38. Remuneration of members of the Council.
39. Delegation of powers by the Council.
40. Liabilities of members of the Council, etc.
41. Regulations.
42. Offences for which penalty is not specifically provided in the Act.
43. Powers of exemption.

FIRST SCHEDULE
THE COUNCIL

SECOND SCHEDULE

THE UNITED REPUBLIC OF TANZANIA



No. 18 OF 1979

I ASSENT.

J. K. NYERERE,
President

8TH DECEMBER, 1979

An Act to establish the Tropical Pesticides Research Institute, to provide for the research and pesticides control, the functions of the Institute and for the matters connected with and incidental to the establishment of the Institute

[.....]

ENACTED by the Parliament of the United Republic of Tanzania.

PART I

PRELIMINARY

1. This Act may be cited as the Tropical Pesticides Research Institute Act, 1979, and shall come into operation on such date as the Minister may by notice in the *Gazette*, appoint.

Short title
and
commence-
ment

2. In this Act, unless the context requires otherwise—

“analyst” means any person appointed as an analyst under section 21;

Interpre-
tation

“the Council” means the Council of the Institute established under section 6 (2);

“the Director” means the Director of the Institute appointed under section 8 (1);

“export” means to be taken or cause to be taken out of the United Republic;

“financial year” means any period not exceeding twelve consecutive months designated in that behalf by the Council;

Provided that the first financial year after the commencement of this Act shall commence on the date of commencement of this Act and may be of a period longer or shorter than twelve months;

“import” means to bring or cause to be brought into the United Republic;

“inspector” means any person appointed as an inspector under section 21;

- “the Institute” means the Tropical Pesticides Research Institute established by section 3;
- “member” in relation to the Council means a member of the Council and includes the Chairman and the Vice-Chairman;
- “Minister” means the Minister for the time being responsible for Agriculture;
- “pesticide” means any matter of any description (including acaricides, arboricides, herbicides, insecticides, fungicides, molluscicides, nematocides, hormonal sprays and defoliant) used or intended to be used, either alone or together with other material or substance—
- (a) for the control of weeds, pests and disease in plants; or
 - (b) for the control of external vectors of veterinary or medical disease and external parasites of man or domestic animals; or
 - (c) for the protection of any food intended for human or animal consumption;
- “the register” means the register of pesticides maintained under section 15 and “registrar” and “registration” shall be construed accordingly.

PART II

THE TROPICAL PESTICIDES RESEARCH INSTITUTE

Establishment of the Institute

3.—(1) There is hereby established a body corporate to be known as the Tropical Pesticides Research Institute.

(2) The Institute shall—

- (a) have perpetual succession and an official seal;
- (b) in its corporate name, be capable of suing and being sued;
- (c) subject to the provisions of this Act, be capable of holding, purchasing and otherwise acquiring in any other way, any movable or immovable property, and of disposing of any of its property.

Functions of the Institute

4.(i) The functions of the Institute shall be—

- (a) to carry out, and promote the carrying out, of research, and to evaluate and disseminate the findings on the fundamental aspects of pesticides application and behaviour in relation to the control of tropical pests by both ground and aerial spraying techniques in the fields of—
 - (i) agricultural entomology;
 - (ii) plant pathology;
 - (iii) bird pests;
 - (iv) rodents;
 - (v) tsetse entomology;
 - (vi) mosquito entomology;
 - (vii) malacology;
 - (viii) ticks;
 - (ix) pesticides toxicology;

- (x) chemistry;
 - (xi) physics;
 - (xii) engineering;
 - (xiii) botany;
 - (xiv) environmental pollution; and
 - (xv) photographic service,
- (b) to establish and maintain a National Herbarium to render services to other institutions in the United Republic and to carry out taxonomic research;
- (c) to establish a Plant Quarantine Station to handle all phytosanitary matters in the United Republic;
- (d) to carry out other functions within its jurisdiction as may be conferred upon it by or under this Act or any other written law;
- (e) to do anything which may be necessary to uphold the credit of the Institute and of its research findings, to obtain and justify public confidence, to avert or minimize any loss to the Institute and to facilitate the proper and efficient performance of its functions.

(2) In particular, but without prejudice to the generality of subsection (1), the Institute shall, for the purpose of ensuring effectiveness of pesticides, use in the production of crops, fibres, livestock and for the protection of public health and safety—

- (a) supervise and regulate the manufacture, importation, distribution, sale and use of pesticides in the United Republic;
- (b) administer regulations made under the provisions of this Act.

(3) For the purposes of the better performance of its functions the Institute shall establish and maintain a system of collaboration with the Tanzania National Scientific Research Council established by the Tanzania National Scientific Research Council Act, 1968, and with any other person or body of persons established by or under any written law and Acts, 1968 No. 1 having functions related to those specified in subsection (1) or (2) or which relate to pesticides research or scientific research or scientific development generally.

5.—(1) The control and management of the East African Pesticides Research Institute and East African Pesticides Control Organization shall, from the date of commencement of this Act, and without further assurance, vest in the Institute.

(2) The Minister may, after consultation with the Council, by order in the *Gazette*, declare any research Institute or establishment or part of it where scientific research is conducted or in which it is intended to conduct scientific research, sponsored by or on behalf of the Government, to be a research institute or research centre or experiment station and vest in the Institute the management and control of that institute, centre or experiment station.

Vesting of
the East
African
Tropical
Pesticide
Research
Institute and
the East
African
Pesticides
Control
Organiza-
tion and
provisions
relating to
land

(3) The Institute shall be granted a right of occupancy over the land over which it is established upon such terms and conditions as the President may approve, subject to subsection (4) and (5).

(4) Until a right of occupancy is granted it shall be lawful for the Institute to exercise in relation to the land over which it is established, all the rights necessary for the performance of its functions which the owner of the right of occupancy may lawfully exercise over land comprised in the right of occupancy granted to him, and the fact that no right of occupancy has been granted to the Institute shall not affect the validity of anything done or omitted *bona fide* by any person in the execution of his duties under this Act.

(5) No fee or duty shall be charged or payable in respect of the issue to the Institute of a certificate in respect of a right of occupancy granted in accordance with this section.

PART III

ADMINISTRATION

The Council
of the
Institute

6.—(1) There shall be established a Council of the Institute which shall subject to this Act, be responsible for the performance of functions and management of the affairs of the Institute.

(2) The provisions of the First Schedule to this Act shall have effect in respect of the constitution of the Council, its proceedings and other matters relating to it.

(3) Save in the case of matters relating to the office and appointment of the Chairman of the Council and the Director of the Institute, the Minister may, by order published in the *Gazette*, amend, add to, vary or replace any of the provisions of the first Schedule to this Act.

(4) The Minister may give to the Council directions of a general or specific character regarding the performance by the Institute of any of its functions under this Act, and the Council shall give effect to every direction given to it.

Power and
duties of
the Council

7.—(1) Subject to the provisions of this Act, the management and control of the Institute shall be vested in the Council.

(2) In particular, but without prejudice to the generality of subsection (1) the Board shall have the power—

- (a) to administer the properties of the Institute, both movable and immovable;
- (b) to administer the funds and assets of the Institute;
- (c) to signify the acts of the Institute by use of the official seal;
- (d) on behalf of the Institute, to receive fees, grants, gifts and other moneys and to make disbursements to other persons or bodies of persons;

- (e) subject to the provisions of this Act, to appoint such employees of the Institute as it may consider necessary for the better performance of the Council, be necessary or expedient for the proper performance of the functions of the Institute.

8.—(1) There shall be a Director of the Institute who shall be appointed by the President. Director of
the Institute

(2) The Director shall be the chief executive officer of the Institute and shall perform such other functions as the Council may consider necessary to delegate to him to enable him to transact all the day-to-day business of the Institute, and in particular without prejudice to the generality of the foregoing and subject to any directions given by the Council, the Director shall have the power to exercise supervision and control over acts of all employees of the Institute, and dealing with all questions relating to the terms and conditions of service of the employees of the Institute.

(3) In the exercise of the powers vested in him by this section or delegated to him by the Council, the Director shall, comply with any direction of policy or of general nature given to him whether generally or specifically and, not depart or permit departure from the approved estimates of expenditure or from the approved establishment of Institute or the normal procedures of dealing with any particular matter.

(4) For the purposes of the better performance of the functions of the Institute, the Director shall—

- (a) cause the coordination of all research and registration activities under the Institute;
- (b) stimulate research activities and ensure the publication of scientific findings and other form of scientific knowledge for dissemination to the public, government and other bodies;
- (c) preside over all meetings of the Pesticides Approval and Registration Technical Committee;
- (d) perform any other duties which may be delegated to him by the Council.

PART IV

OPERATIONS OF THE INSTITUTE

9.—(1) The Council shall establish such Research Committees and sub-Committees as it may deem necessary for the coordination of research carried out by or on behalf of the Institute. Research
Committees
and
provisions
relating to
research

(2) Notwithstanding the provisions of Section 41 the Council may, after consultation with the Minister, make rules regarding—

- (a) the procedure for the submission to the Institute of proposals for carrying out of research into a particular aspects of tropical pesticides;
- (b) the manner in which the proposals for the carrying out of research shall be dealt with by the Institute;
- (c) the rights and obligations of persons carrying out pesticides research in the United Republic;

- (d) the control of, and other dealings with plants, birds, animals and other animate or inanimate objects used in carrying out research.

Information on pesticides research to be furnished to the Institute

10.—(1) Every person engaged or purporting to engage, in tropical pesticides research within the United Republic shall, at his own expense furnish to the Institute information relating to research and shall make available to the Institute copies of any relevant records or findings in such form and within such period as may be prescribed.

(2) Any person who contravenes or fails to comply with subsection (1) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding ten thousand shillings, but no person shall be prosecuted for any offence under this section within six months after the commencement of of this Act.

(3) Notwithstanding subsection (1), the Institute may enter into agreements with firms or organizations engaged in pesticides or other allied scientific research, within or outside Tanzania, for the purposes of establishing a system of exchanging information in relation to pesticides or other allied scientific research.

Institute may call information on pesticides research

11.—(1) The Institute may require in writing any person or body of persons engaged in the pesticides or other allied scientific research within Tanzania to furnish to it such information relating to pesticides or other allied scientific research as the Institute may specify.

(2) Every person or body of persons required to furnish information under subsection (1) shall comply with the requirement and any person or body of persons refuses or fails to comply with that requirement shall be guilty of an offence and shall be liable on conviction to a fine not exceeding fifteen thousand shillings.

Provisions relating to discoveries

12.—(1) Where as a result of any research carried out by or behalf of the Institute anything is discovered, the discovery shall be come the property of the Institute.

(2) For the purposes of commercial exploitation of any discovery which the Institute considers important for the use in relation to the control of tropicals pests or for the betterment of improvement in the techniques of pesticides application, the Institute may arrange with any person or body of persons to buy, sell, take or grant patent rights in the discovery, subject to terms approved by the Council.

(3) Every discovery made as a result of research carried out under this Act shall be registered by the Institute in such form and upon such conditions as the Minister may, by regulations made under this Act, prescribe.

(4) The Institute may, with the prior approval of the Minister, grant to any person who makes a discovery which the Institute considers significant or whom materially assists or contributes to the making of that discovery, such reward as may be approved by the Council.

13.—(1) There shall be Pesticides Approval and Registration Technical Committees of the Institute which shall be responsible to the Council in the exercise of the functions conferred upon it by or under this Act and which shall, subject to any general or specific directions of the Council—

Pesticides
Approval and
Registration
Technical
Committees

- (a) advise the Council on pesticides regulations, control and registration;
- (b) draw short and long term pesticides registration programmes;
- (c) review and formulate registration and approval programmes consistent with the country's needs.

(2) Subject to the provisions of Pharmaceuticals and Poisons Act, 1978, Part V of this Act shall apply *mutatis mutandis* in relation to the control and regulation of the manufacture, importation, sale, distribution and use of pesticides in the United Republic.

Acts, 1978
No. 9
f

14.—(1) There shall be Programmes of the Institute to be carried out in divisions specified in the Second Schedule to this Act.

Programme S
of the
Institute

(2) The Director may, in consultations with the Council, amend, add to, vary or replace all or any of the provisions of the Second Schedule to this Act.

PART V

PESTICIDE CONTROL

15. The Institute shall establish and maintain a register of pesticides and shall cause to be entered therein the name, specified minimum quality suitability for use and such other particulars as it may require of every pesticide which may, subject to the conditions (if any) imposed by the Institute, be manufactured or compounded in or imported into the United Republic.

Register of
pesticides

16.—(1) Any person who desires to register a pesticide shall make application to the Institute in such form as the Institute may specify, and shall furnish such information as the Institute may reasonably require.

Applications
for
registration
of pesticides
and
cancellation
of
registrations

(2) The Institute may at its discretion register or refuse to register a pesticide, and may register a pesticide subject to such conditions as it thinks fit:

Provided that where the Institute refuses to register a pesticide, it shall inform the applicant in writing of the refusal and the grounds thereof.

(3) The Institute may for good cause, and after giving the person on whose application a pesticide was registered an opportunity to show cause why the registration of that pesticide should not be cancelled, cancel the registration of that pesticide.

(4) Any person who makes or causes to be made, either orally or in writing, any declaration or representation which he knows or has reason to know to be false for the purpose of obtaining the registration of a pesticide shall be guilty of an offence and liable to a fine not exceeding three thousand shillings or to imprisonment for a term not exceeding three months or to both such fine and such imprisonment.

Appeals

17. Any person aggrieved by the refusal by the Institute to register a pesticide or by the cancellation by the Institute of the registration of a pesticide may, within thirty days after such refusal or cancellation, appeal in writing to the Minister, whose decision shall be final.

Publication in Gazette of list of pesticides

18. The Institute shall compile and publish in the *Gazette* in such form as it thinks fit a list to include therein any pesticide subsequently registered by it or shall from time to time amend the list to include therein any pesticide subsequently registered by it or delete therefrom any pesticide the registration of which has been cancelled by it.

Manufacture, importation, sale, etc., of un-registered pesticides and offences

19. Any person who manufactures, compounds, imports, distributes, sells or offers or exposes for sale or uses or causes to be used any pesticide other than a registered pesticide shall be guilty of an offence and shall be liable to a fine not exceeding three thousand shillings or to imprisonment for a term not exceeding three months or to both such fine and such imprisonment.

Provided that it shall be a defence for a person charged with an offence under this section to prove that the manufacture, compounding, importation, distribution, sale or offers or exposure for sale, as the case may be, of the pesticide was authorized by the Institute or was for the purpose of *bona fide* research or analysis or was intended for export.

Labelling of registered pesticides

20.—(1) Every registered pesticide distributed sold, offered or exposed for sale shall bear on the container thereof a name, a true description of its active ingredient chemical together with the percentage or proportion of each active ingredient in relation to its net weight or volume, a description of the precautions to be taken on its use and the words "Approved by the Tropical Pesticides Research Institute" as well as the name and address of the person, firm or company which manufactured or compounded it.

(2) Any person who distributes, sells, offers or exposes for sale any registered pesticide which does not conform with the requirements of this section or of any regulations made under requirements of this section or of any regulations made under this Act shall be guilty of an offence and shall be liable to a fine not exceeding three thousand shillings or to imprisonment for a term not exceeding three months or to both such fine and such imprisonment.

21.—(1) The Institute may appoint inspectors and analysts for the purposes of this Act. Appointment
and powers
of inspectors
and analysts

(2) No person shall, while holding an appointment as an inspector or an analyst, engage directly or indirectly in any trade or business connected with the manufacture, importation, sale or distribution for sale of any pesticides.

(3) An inspector may, at all reasonable times and on production, if required, of his authority—

- (a) enter and inspect any premises, vehicle, vessel or aircraft in which any pesticide is kept or in which he has reasonable grounds for suspecting that any pesticide is kept;
- (b) seize and remove any pesticide and any books, records or other documents relating to such pesticide from any premises vehicle, vessel or aircraft if he has reasonable cause to believe that such pesticide has been manufactured, compounded, imported, sold or offered or exposed for sale in contravention of this Act;
- (c) take samples of any pesticides for the purpose of examination or analysis;
- (d) require any person in occupation of the premises or any agent or servant of any such person, or any person in charge of the vessel, vehicle or aircraft, to furnish all such information, to produce for inspection all such books, records or other documents and to furnish all such means of inspection as he may reasonably require for the purposes aforesaid.

(4) An inspector shall take such steps as are reasonably practical to afford the owner of any premises or the person in charge of any vehicle, vessel or aircraft, as the case may be, an opportunity to be present while an inspection under this section is being carried out.

(5) At any time when anything is seized under this section the person in whose custody or possession it is shall be given a written receipt for it.

22.—(1) Any person who—

- (a) wilfully delays or obstructs an inspector in the exercise of his powers under section 21; or
- (b) refuses to furnish any information, to produce any documents or to furnish any means of inspection, when required to do so under section 21,

Obstruction ✓

shall be guilty of an offence and liable to a fine not exceeding three thousand shillings or to imprisonment for a term not exceeding three months or to both such fine and such imprisonment:

Provided that no person shall be required under this section to answer any question tending to incriminate him.

If an inspector applies to purchase any pesticide or any substance used in the manufacture of pesticides which is offered or exposed for sale and tenders the price for the quantity which he requires as a sample, and the

person offering or exposing the pesticide or the substance for sale refuses to sell to the inspector such quantity thereof as aforesaid, or if the seller, consignor or any person having for the time being the charge of any pesticide or substance of which an inspector is empowered to take a sample refuses to allow the inspector to take the quantity which he requires as a sample, the person so refusing shall, for the purpose of subsection (1), be deemed to have wilfully obstructed the inspector:

Provided that where any pesticide or substance is exposed for sale in an unopened container duly labelled, no person shall be required to sell it except in the unopened container in which it is contained.

Taking and
submission
of sample for
analysis

23.—(1) Any purchaser of any pesticide or any substance capable of being used in the manufacture or preparation of pesticides or any inspector may submit a sample of such pesticide or substance to an analyst for analysis or examination.

(2) Where a sample of any pesticide is taken with the intention of having it submitted to an analyst for analysis or examination, the person taking such sample shall, as soon as possible inform in writing the seller or the owner of the pesticide or his representative of his intention to have the sample analysed or examined by an analyst.

Division and
analysis of
sample

24.—(1) An inspector or any other person who takes or purchases a sample for the purpose of analysis or examination shall divide it into three parts, each part to be marked and sealed or fastened up in such manner as its nature will permit, and unless he sooner decides not to have the sample analysed or examined, shall give one part to the person from whom it was obtained or to the owner or occupier of the premises from which it was obtained or a representative of any of them, one part to an analyst and the other part shall be retained by him.

(2) Every analyst shall, as soon as possible after receiving a sample obtained under this Act, analyse or examine the sample, as the case may be, and give to the person by whom it was originally submitted a certificate, in the prescribed form, setting out the findings of the analysis or examination and such observation as he may consider necessary or desirable and shall forward a copy of such certificate to the person who received part of the sample in accordance with subsection (1).

(3) Where any person procures a sample under section 23 (1) and the division into parts of such sample—

- (a) is not reasonably practicable; or
- (b) might affect the composition or impede the proper analysis or examination of the sample,

the provisions of this section with respect to the division of samples into parts shall be deemed to have been complied with if the person taking the sample procures three separate fair amounts of the pesticide or substance and deals with each lot as if it were a part in the manner provided by this subsection; and references in this Act to a part of a sample shall be construed accordingly.

25. Any person who knowingly makes any false statement, issues or maintains any false or misleading declaration, document, marking or description of a pesticide in connection with the manufacture, importation or sale of a pesticide or any substance capable of being used in the manufacture of pesticides shall be guilty of an offence and liable to a fine not exceeding three thousand shillings or to imprisonment for a term not exceeding three months or to both such fine and such imprisonment.

Giving false information, etc., in connection with manufacture, importation or sale of pesticides and offences

26. Any member of the Institute and any person being employed in the execution of any duty under this Act who—

Unlawful disclosure of information and offences

- (a) by virtue of such membership or employment becomes possessed of any information which might influence or affect the market value of any share or other security, interest, product or article and who, before such information is made public, directly or indirectly uses such information for personal gain; or
- (b) without lawful authority publishes or communicates to any person, otherwise than in accordance with the provisions of this Act, any information acquired by him in the course of such membership or employment,

shall be guilty of an offence and liable to a fine not exceeding three thousand shillings or to imprisonment for a term not exceeding three months or to both such fine and such imprisonment.

27.—(1) Where any person furnishes the Institute with any information or makes available to the Institute any record or returns pursuant to regulations made under section 41, the Institute shall not, save for the purposes of proceedings under this Act, disclose or cause to be disclosed such information or the contents of such record or returns to any person not employed in the execution of a duty under this Act.

Disclosure of information by the Institute

(2) Notwithstanding subsection (1), the Institute shall publish or cause to be published any information furnished to the Institute or the contents of any record of returns made available to the Institute pursuant to the regulations made under section 41 in the form of a summary which does not enable identification of the source of the information, record or returns.

28. A court convicting a person of any offence under this Act may order that—

Power of court to make orders

- (a) the pesticide or other substance used in the manufacture of pesticides in respect of which the offence was committed shall be forfeited and subsequently disposed of as the court may direct;
- (b) the person convicted shall pay the whole or any part of the fees or other expenses incurred in the examination or analysis of any pesticide or other substance.

29. In any proceedings under this Act—

Evidence

- (a) a sample of any pesticide obtained by any inspector shall be deemed to be a fair sample and to possess in all respects the same properties as the whole from which it was obtained;

- (b) a certificate of analysis issued by an analyst shall be admissible without further proof and shall be sufficient evidence of the facts or observations stated therein unless the other party requires that the analyst who issued it shall be called as a witness;
- (c) where a sample has been procured or obtained in such circumstance that its division into parts is required by this Act, the part of the sample retained by the person who procured it shall be produced at the hearing.

Criminal liability of bodies corporate and their officers

30. Where an offence under this Act which has been committed by a body corporate is proved to have been committed with the consent or connivance or, or to be attributable to any neglect on the part of any director, manager, secretary or other similar officer of the body corporate or any person purporting to act in such capacity, he as well as the body corporate shall be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

PART VI

FINANCIAL PROVISIONS

Funds and resources of the Institute

31. The funds and resources of the Institute shall consist of—
- (a) such sums as may be provided for the purposes of the Institute by Parliament, either by way of grant or loan;
 - (b) such funds or assets as may rest in or accrue to the Institute from other sources by way of grants, gifts, fees or in any other way;
 - (c) any sum which the Council may, subject to the provisions of section 34 borrow for the purposes of the Institute;
 - (d) any sum or property which may in any manner become payable to or vested in the Institute;
 - (e) revenue from fees imposed by the Institute for pesticides applications, registrations and restricted permits;
 - (f) revenue from any cess which the Institute in consultation with the Council may, by Order in the *Gazette* impose on any pesticides imported into the United Republic.

Annual and supplementary budget

32.—(1) Not less than two months before the beginning of any financial year the Board shall at its first meeting especially convened for that purpose, pass a detailed budget (in this Act called the "annual budget") of the amounts respectively—

- (a) expected to be received; and
- (b) expected to be disbursed by the Council during the financial year.

(2) If in any financial year the Board requires to make any disbursement not provided for, in the annual budget for the year, the Council shall at a meeting, pass a supplementary budget detailing the disbursement.

(3) The annual budget and every supplementary budget shall be in such form and include such details as the Minister may approve.

(4) Forthwith upon the passing of the annual budget or any supplementary budget the Council shall submit the budget to the Minister for his approval.

(5) The Minister shall, upon the receipt of the annual budget or supplementary budget, approve or disapprove it or approve it subject to such amendment as he may consider fit.

(6) Where the Minister has approved any annual budget or supplementary budget the budget as approved by him, whether with or without amendment, shall be binding on the Board which, subject to the provisions of subsection (7) shall confine its disbursement within the items and amounts contained in the applicable estimates as approved by the Minister.

(7) The Council may—

- (a) with the sanction in writing of the Minister make disbursement notwithstanding that the disbursement is not provided for in any budget;
- (b) from the amount of expenditure provided for in any budget in respect of any item, transfer a sum not exceeding two hundred thousand shillings to any other item contained in the budget;
- (c) adjust expenditure limits to take account of circumstances not reasonably foreseeable at the time the budget was prepared, subject to submitting a supplementary budget to the Minister within two months of the alteration of expenditure limits becoming necessary.

33. With the prior approval of the Minister the Council may, from time to time, invest any part of the moneys available in any fund in investments authorized by the Trustees Investments Act, 1967, for investment of any trust fund. Investment Acts, 1967 No. 33

34.—(1) With prior approval of the Minister, the Council may, from time to time, borrow moneys for the purposes of the Institute by way of loan or overdraft, and upon such security and such terms and conditions relating to repayment of the principal and payment of interest, subject to any direction by the Minister, the Council may consider fit. Power to borrow

(2) A person lending money to the Council shall not be bound to enquire whether the borrowing of that money by the Council has been approved by the Minister.

35.—(1) The Council shall cause to be provided and kept proper books of accounts and record with respect to— Accounts and audit

- (a) the receipt and expenditure of moneys by, and other financial transaction of the Institute;
 - (b) the assets and liabilities of the Institute,
- and shall cause to be made out for every financial year a balance sheet and a statement showing details of the income and expenditure of the Institute and all its assets and liabilities.

Acts, 1968
No. 1

(2) Not later than six months after the close of every financial year the accounts including the balance sheet of the Institute in respect of that financial year shall be audited by the Tanzania Audit Corporation established by the Tanzania Audit Corporation Act, 1968.

(3) Every audited balance sheet shall be placed before a meeting of the Council and, if adopted by the Council, shall be endorsed with the certificate that it has been adopted.

Annual
statement
on accounts
and report
to be sub-
mitted to
the Minister

36. The Council shall within six months after the close of the financial year, cause to be prepared and submitted to the Minister a report dealing generally with the activities and operations of the Institute during that year and accompanied by—

- (a) a copy of the audited accounts of the Institute;
- (b) a copy of the auditors report on the accounts; and
- (c) such other information as the Minister may direct.

Annual
statement
and report
to be laid
before the
National
Assembly

37. The Minister shall as soon as practicable, and in any case not later than twelve months after the close of a financial year, lay before the National Assembly the following documents in relation to that financial year—

- (a) a copy of the audited statement of accounts of the Institute;
- (b) a copy of the auditors report, if any; and
- (c) a copy of the report by the Council.

PART VII

MISCELLANEOUS PROVISIONS

Remunera-
tion of
member of
the Council

38. The members of the Council shall be entitled to such remuneration, fees or allowances for expenses as the Minister may, upon the recommendation of the Council, prescribe from time to time:

Provided that no remuneration, fees or allowances, except such allowances for expenses as may be expressly authorized by the Minister shall be paid to any member of the Council who is a public officer.

Delegation
of powers
by the
Council

39.—(1) Subject to the provisions of subsection (6), the Council may from time to time, by writing under the official seal of the Institute appoint committees of the Council and delegate, subject to such terms, conditions and restrictions as it may specify, to any committee of the Council or to any employee of the Institute, all or any of the functions, powers or duties conferred or imposed by or under this Act on the Council, and where any delegation is so made the delegated function, power or duty may be performed or exercised by delegate subject to the terms, conditions and restrictions specified by the Board.

(2) The delegation under subsection (1) may be made to the holder, of the office under the Institute specifying the office but without naming the holder, and in every case where a delegation is so made each successive holder of the office in question and any person who occupies or performs

the duty of that office may, without any further authority, perform or exercise the delegated function, power or duty in accordance with the delegation, power or duty in accordance with the delegation made by the Council.

(3) The Institute may revoke a delegation made by it under this section.

(4) No delegation made under this section shall prevent the Council from itself performing or exercising the function, power or duty delegated.

(5) A delegation made under this section may be published in the *Gazette*, and upon its being so published shall be judicially noticed and shall be presumed to be in force unless the contrary is proved.

(6) The Council shall not have power under this section to delegate—

(a) its power of delegation; or

(b) the power to approve the annual budget or any supplementary budget, the annual balance sheet or any statement of accounts.

40. Without prejudice to the provisions of section 284A of the Penal Code or of the Specified Officers (Recovery of Debts) Act, 1970 or of the Parastatal Employees (Recovery of Debts) Act, 1974 no act or things done or omitted to be done, by any person who is a member of the Council or employee or agent of the Institute shall, if done or omitted *bona fide* in the execution or purported execution of his duties as the member of the Council or employee or agent of the Institute, subject that person to any action, liability or demand of any kind.

Liabilities
of members
of the
Council, etc.,
Cap. 16
Acts, 1970
No. 7
Acts, 1974
No. 37

41.—(1) With the consent of the Minister the Council may make regulations for the better carrying out of the purposes and provisions of this Act, without prejudice to the generality of this subsection, may make regulations—

(a) prescribing the conditions and terms upon which any specified facilities or services or categories of facilities or services within the scope of the functions of the Institute shall be provided to or public and other persons;

(b) providing for the proper management, control and administration of the Institute;

(c) providing and regulating discipline amongst employees of the Institute and disciplinary proceedings against them;

(d) prescribing fees, rates and other charges in connection with the provision by the Institute of any services or facilities;

(e) prescribing the manner in which samples are to be taken for the purpose of analysis or examinations;

(f) requiring manufacturers, importers or sellers of pesticides or of any substance used in the manufacture of pesticides to keep and produce records and furnish returns to the Institute;

Regulations

- (g) prescribing minimum standards as to the composition and efficacy of pesticides and substances capable of being used in the manufacture of pesticides,
- (h) prescribing the procedure for applications to have pesticides registered;
- (i) prescribing forms to be used for any purpose under this Act;
- (j) prescribing anything which may be prescribed under this Act;
- (k) providing for any matter which, in the opinion of the Council, is necessary to provide for the efficient performance of the functions of the Institute.

(2) Regulations made under this section shall be published in the *Gazette*:

Provided that where regulations are made which are not of general application, the Council may, in addition to or in lieu of publication in the *Gazette*, publish the regulation in such a manner as will, in the opinion of the Council, ensure the contents of the regulation coming to the notice of the persons or category of persons in respect of which they apply and of the members of the public who might be affected by the regulations.

Offences for which a penalty is not specifically provided in the Act

42. Any person who commits an offence against this Act, for which a penalty is not specifically provided elsewhere in this Act, shall be liable on conviction to a fine not exceeding three thousand shillings or to imprisonment for a term not exceeding three months or to both such fine and such imprisonment.

Powers of exemption

43. The Minister may by order in the *Gazette*, exempt any person from any or all of the provisions of this Act.

FIRST SCHEDULE

(Section 6 (2))

Composition of Council

- I.—(1) The Council shall consist of—
- (a) a Chairman who shall be appointed by the President;
 - (b) the Director;
 - (c) not less than ten other members who shall be appointed by the Minister from among persons nominated, one each by—
 - (i) Ministry of Agriculture (Crops Division);
 - (ii) Ministry of Agriculture (Livestock Division);
 - (iii) Ministry of Health;
 - (iv) Ministry of Industries;
 - (v) Ministry of Natural Resources;
 - (vi) Office of the Prime Minister;
 - (vii) The University of Dar es Salaam;
 - (viii) Tanzania National Scientific Research Council;
 - (ix) The Attorney-General.
 - (d) The Director-General of Tanzania Livestock Research Organization;
 - (e) The Director-General of Tanzania Agricultural Research Organization;

- (1) four other members who shall be appointed by the Minister from any relevant Institution.
- (2) The Council may appoint any employee of the Institute to be the Secretary of the Council.
2. Members of the Council shall elect one of their members to be the Vice-Chairman Vice-shall, subject to his continuing to be a member, hold office for a term of one year from Chairman the date of his election and shall be eligible for re-election.
- 3.—(1) A member of the Council shall hold office for such period as the appointing Tenure of authority may specify in his appointment, or if no period is so specified, shall hold office appointment for a term not exceeding three years from the date of his appointment, and shall be eligible for re-appointment.
- (2) In the case of a member who is a member by the virtue of his holding some other office, he shall cease to be a member upon his ceasing to hold that office.
- (3) The appointing authority may at anytime revoke an appointment made by him under paragraph 1 and any member so appointed may at any time resign his office by notice in writing to the appointing authority.
4. If a member of the Council who is a member by the virtue of his holding some other office is unable for any reason to attend any meeting of the Council, he may nominate in writing another person from his institution to attend the meeting in his place. Absent member may be represented
5. If any vacancy occurs in the membership of the Council by reason of the death, resignation or permanent incapacity of any member thereof or otherwise, the appointing authority may appoint another person to fill that vacancy, and the person so appointed shall hold office for the unexpired residue of period of office of the member in whose place he is appointed. Casual Vacancies
6. The Minister may, on the advise of the Council, by order published in the *Gazette*, from time to time, vary the composition of the Council. Variation of the composition of the Council
- 7.—(1) The Council shall ordinarily meet for the transaction of its business at the times and places determined by it, but shall meet at least once every three months. Meetings and procedure of the Council
- (2) The Secretary of the Council shall give each member adequate notice of the time and place of every meeting and shall keep the record of the proceedings of every meeting of the Council.
- (3) The Chairman, or in his absence the Vice-Chairman, shall preside at every meeting of the Council. In the absence of both the Chairman and the Vice-Chairman, members present shall appoint one of their member to preside over the meeting.
- (4) The Chairman or with his consent, the Secretary, may invite any person who is not a member to participate in the deliberations at any meeting of the Board, but any person so invited shall not be entitled to vote.
- 8.—(1) The quorum at any meeting of the Council shall be one half of the total number of members of the Council and, where there is an uneven number of members, shall be the whole next number above half. Quorum
- (2) Subject to the provisions of sub-paragraph (1) the Council may act, notwithstanding any vacancy in its number.
- 9.—(1) Questions proposed at the meeting of the Council shall be decided by a majority of the votes of the members present and voting and in the event of an equality of the of votes, the person presiding shall have a second vote in addition to his casting or deliberative vote. Council
- (2) Notwithstanding sub-paragraph (1), a decision may be made by the Council without a meeting by circulation of the relevant papers among the members, and the expression in writing of the views of the majority of members.

The Council to confirm minutes of its meetings

10.—(1) The Council shall cause to be recorded and kept minutes of all business conducted or transacted at its meetings, and the minutes of each meeting of the Council shall be read and confirmed, or amended and confirmed, at the next meeting of the Council and signed by the person presiding at the meeting.

(2) Any minutes signed, or purporting to have been signed, by the person presiding at the meeting of the Council shall, in absence of proof of error, be deemed to be correct record of the meeting whose minutes they support.

Orders, directions, etc., by the Chairman or the Director

11. No act or proceeding of the Council shall be invalid by reason only of any vacancy among its members or defect in the appointment of any of them.

Vacancies, etc., not to invalidate proceedings

12. All orders, directions, notices or other documents made or issued on behalf of the Council shall be signed by—

- the Chairman of the Council; or
- the Director or any other officer of the Institute appointed in writing in that behalf by the Director.

13. The Seal of the Council shall not be fixed on any instrument except in the presence of any of the following persons—

- the Chairman;
- the Vice-Chairman;
- the Director;
- any other employee of the Institute appointed in writing in that behalf by the Director.

The Council may regulate its proceedings

14. Subject to the provisions of this Schedule the Council may regulate its own proceedings.

SECOND SCHEDULE

(Section 14 (1))

Programmes of the Institute

Each Research Division below shall carry research activities on disciplines and aspects of pesticides specified opposite to its name—

- Agricultural Research Division—
 - Agricultural entomology—insecticides;
 - botany—herbicides;
 - plant pathology—fungicides;
 - bird pests—avicides;
 - rodents—rodenticides.
- Medical and Veterinary Research Division—
 - tsetse entomology—insecticides;
 - mosquito entomology—insecticides;
 - malacology—molluscicides;
 - ticks—acaricides;
 - pesticides—toxicology—toxicological aspects.
- Chemical and Physical Research Division—
 - chemistry—chemical aspects;
 - physics—physical aspects;
 - engineering—engineering aspects;
 - environmental pollution—pesticides pollution;
 - photographic unit—photographic service.
- National Herbarium—
 - taxonomy—taxonomic research;

The Seal
of the
Council

- (ii) botanical specimens—taxonomic services;
- (iii) botanical garden—Research and service.
- (c) Plant Quarantine Stations—
 - (i) pathology—pathological aspects;
 - (ii) virology—virology aspects;
 - (iii) horticulture—horticultural aspects.
- (f) Pesticides Control and Registration—
 - (i) analytical—analytical services;
 - (ii) inspectorate—inspection services;
 - (iii) registration—registration.

Passed in the National Assembly on the twenty-fourth day of October,
1979.

E. E. KAZIMOTO,
Clerk of the National Assembly

Appendix XI. Tanzania's Pesticide Regulation.

Pesticides Control Regulations

GOVERNMENT NOTICE No. 193 published on 12/10/84

THE PESTICIDES CONTROL REGULATIONS, 1984

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G.N. No. 193 (cont.)

THE TROPICAL PESTICIDES RESEARCH INSTITUTE
ACT, 1979
(No. 18 of 1979)

REGULATIONS

Made under section 41

PESTICIDES CONTROL REGULATIONS, 1984

Short title

1. These Regulations may be cited as the Pesticides Control Regulations, 1984.

Interpretation
Act, 1979
No. 18

2. In these Regulations, unless the context otherwise requires—

"Act" means the Tropical Pesticides Research Institute Act, 1979;

"Chairman" means the Chairman of the Pesticides Approval and Registration Technical Committee who is also the Director of the Institute;

"Committee" means the Pesticides Approval and Registration Technical Committee established under section 13 of the Act;

"compounding" means mixing of pesticide ingredient with another ingredient including diluent;

"form" means a form set out in the Schedule to these Regulations;

"formulating" means prescribing and, or mixing pesticide ingredient according to a particular formulae;

"Institute" means the Tropical Pesticides Research Institute;

"laboratory" means the Pesticides Registration and Control analytical laboratory at the Institute or the laboratory of any analyst appointed under section 21 of the Act;

"label" means any written, printed or graphic matter on the immediate container and on every other receptacle or package in which the contents is placed or packaged;

"manufacture" in relation to any pesticide includes—
any process or part of a process for making, altering, finishing, packing, labelling, breaking up or otherwise treating or adopting any pesticide with a view to its sale, distribution or use, and includes any process of formulating and compounding such pesticides;

"package" means a receptacle or wrapper in which a pesticide container is placed or packaged during storage or transportation.

"premises" means any land, shop, stall or place where any pesticide is sold or manufactured or stored or used and includes any vehicle carrying pesticide;

"sale" means a sale of any pesticide, whether for cash or on credit and whether by wholesale or retail, and includes an agreement for sale, an offer for sale, the exposing for sale or having in possession for sale of any pesticide and includes also an attempt to sell any such pesticide;

"Schedule" means a schedule annexed to these Regulations.

3. The objects of these Regulations are—

Objects

(i) to ensure the effectiveness of pesticides used in Tanzania for the production of food and fibre and for the protection of public health and safety;

(ii) to protect against possible harmful effects of pesticides including:

(a) impairment of the health of persons handling pesticides or using or consuming products or substances treated with pesticides;

(b) impairment of the health of domestic animals including honey bees, from direct application of pesticides or from the consumption of plants or animals treated with pesticides;

(c) damage to cultivated plants from direct application of pesticides or from persistent soil residues; and

(d) damage to the natural environment including impairment of the health of wildlife and contamination of water, ways, lakes and other water bodies.

4. The Committee shall consist of the following members, namely—

Compo
of the
Comm.

(1) (a) The Director of the Institute;

(b) the Registrar of Pesticides who shall be the Secretary;

(c) the Analyst in charge of the Pesticides Registration and Control Analytical Laboratory;

(d) the Director of Research, Ministry of Agriculture;

(e) the Registrar of the Pharmacy Board, Ministry of Health;

(f) the Chief Government Chemist, Ministry of Health;

(g) one person each representing—

(i) the Tanzania Bureau of Standards (TBS);

(ii) the University of Agricultural, Morogoro;

(iii) the Ministry of Agriculture and Livestock Development;

(iv) the National Chemical Industries;

(v) the Tanzania Agricultural Research Organization (TARO);

(vi) the Tanzania National Scientific Research Council;

(vii) the Tanzania Livestock Research Organization.

(2) The Committee may also co-opt such number of experts and for such purposes or periods as it may deem fit but any expert so co-opted shall have no right to vote.

G.N. No. 191 (contd.)

(3) No member of the Committee shall, while holding such membership, engage directly in any trade or business concerned with importation, manufacture, distribution or sale of any pesticide.

Terms and procedure of the Registration Committee

5.—(1) The persons nominated under clauses (i) (b) (i)–(vii) inclusive of Regulation 4 shall, unless their seats become vacant either by resignation, death or otherwise, hold office for three years from the date of their nomination, but shall be eligible for re-nomination.

(2) The person nominated under paragraph (a) to (b) shall hold office only for as long as they hold the appointment by virtue of which their nomination were made.

(3) The Committee shall regulate its own procedure and the conduct of its business to be transacted by it.

Functions of the Committee

6. The Committee shall in addition to the functions assigned to it by the Act, perform the following functions, namely:—

- (i) to maintain a system of collaboration with any national or international body or person dealing with pesticides;
- (ii) to maintain a system of cooperation with licensing and tendering authorities;
- (iii) to perform such other incidental or consequential matters necessary for carrying out the functions assigned to it under the Act or these Regulations.

Procedure for importation of a pesticide

7.—(1) Every person importing a pesticide shall obtain a permit for importing that pesticide, from the Registrar.

(2) The application for a permit and the permit shall be issued in the form set out respectively in Schedule II and III.

(3) Every importer of a pesticide shall pay a cess of 0.5% of the FOB value of the pesticide to be imported.

(4) Any cess paid under this Regulation shall be refunded by the Institute where it is shown to the satisfaction of the Registrar that the pesticide in respect of which the cess was paid, was not, for any reason, subsequently imported.

Every pesticide in use to be registered

8. Every person who, for commercial purposes or for disposal to any way for use by the public, imports, manufactures, formulates or compounds any pesticide shall register that pesticide in accordance with the Act and these Regulations.

Procedure for registration of a pesticide

9. Every application for pesticide registration or renewal of registration shall be on a form specified in Schedule I to these Regulations and shall, unless otherwise advised, be accompanied by—

- (a) a dossier containing additional information to determine the suitability of the pesticide as to its use and including technical data sheet and direction on how to detect and quantify the active ingredient;
- (b) the appropriate application fee.

G.N. No. 192 (contd.)

(c) a representative sample of the pesticide, certificate of analysis, if already issued, and a written declaration that the pesticide has or has not been banned or restricted in the country of origin.

10.—(1) A sample submitted for analysis for the purposes of registration shall be accompanied by appropriate standards. Submission and analysis of samples

(2) A sample submitted for analysis shall not be less than 0.5 kilogram in case of solids, or not less than 0.5 litres in case of liquids.

(3) The container in which a sample for analysis is packed shall be sealed and adequately labelled.

(4) Every sample submitted for analysis shall be accompanied with the specifications of the sample and other relevant information.

11.—(1) Every pesticide submitted for registration shall be submitted for testing by the Registrar or by a person authorized by him, and the Registrar or the authorized person as the case may be, shall carry out such field and/or laboratory tests as are necessary to determine the suitability for use of the pesticide. Testing of pesticides

(2) Where the testing is carried out by a person other than the Registrar, that person shall submit, as soon as the test is completed the results of the test to the Registrar.

12. The person applying for registration of a pesticide shall satisfy the Registrar that— Additional conditions for registration

(a) the premises for the storage of the pesticide are adequate and well equipped with proper storage accommodation for avoiding any hazards and for preserving the properties of the pesticide in respect of which a registration certificate is sought;

(b) there will be a person or persons on the technical staff of the person applying, who is or are qualified or experienced in handling the pesticide.

13.—(1) If the Registrar is satisfied that a person applying for registration of a pesticide has complied with the provisions of the Act and these Regulations he may register the pesticide. Registration

(2) On registration the person applying for registration of a pesticide shall pay such fees as are provided under these Regulations.

(3) The Registrar may refuse to register a pesticide if he is not satisfied in terms of sub-paragraph (1).

(4) An appeal from a decision of the Registrar refusing to register a pesticide under sub-Regulation (1) shall lie to the Minister and the Minister's decision shall be final.

(5) Every appeal under sub-Regulation (4) shall be made within sixty days from the date of the decision of the Registrar.

14.—(1) If the Registrar approves registration he shall issue a certificate of registration in a form prescribed in Schedule VI in respect of the pesticide whose registration is sought. Certificate of registration

(2) Every certificate for registration shall expire after five years.

Provisional registration 15.—(1) Where by reason of non-compliance with any provisions of these Regulations or any direction given by him, the Registrar is unable to register a pesticide but is satisfied that steps can be taken with diligence by the applicant to comply with such provision or direction, as the case may be, he may in his absolute discretion, by notice in writing (hereinafter referred to as a notice of deferment), defer registration of that pesticide pending compliance with such provision or direction.

(2) The Registrar shall transmit the notice of deferment to the person who applies for registration of the pesticide.

(3) A notice of deferment shall, subject to the provisions of this Regulation and any condition specified in that notice, entitle the person applying for the registration of a pesticide to use or dispose for use by the public, the pesticide.

(4) Every provisional registration shall expire after two years.

16.—(1) Where a pesticide is highly toxic, persistent, biologically cumulative or where that pesticide may cause poisoning of which no effective antidote is known and available, the Registrar may register that pesticide subject to such conditions and restrictions as to its use or the quantity to be disposed of and other conditions that he may deem necessary.

(2) Every registration of a pesticide for restricted use shall expire after two years.

17.—(1) A person who intends to use a pesticide for experimental purposes shall have that pesticide registered in accordance with these Regulations.

(2) Every registration of a pesticide for experimental purposes shall expire after one year.

18.—(1) The fees payable for registration of a pesticide shall be—

(a) full registration: Shillings 3,000/-;

(b) provisional registration: Shillings 2,000/-;

(c) restricted use registration: Shillings 2,000/-;

(d) registration for experimental use: Shillings 300/-.

(2) A fee of shillings 1,000/- shall be charged for analysing a sample submitted for analysis as required under these Regulations.

19. A person who is non-resident and applies for registration of a pesticide shall pay any registration fee required to be paid in equivalent but negotiable foreign currency.

20.—(1) No person may use or alter the character of a registered pesticide for commercial purposes or for disposal in any way to the public unless the alteration is approved by the Registrar.

(2) An application for clearance to use a registered pesticide for commercial purposes shall be made and issued on the forms set out on Schedule IV and V respectively.

21. Manufacturers and formulators of pesticides within Tanzania shall maintain a quality control laboratory or engage a recognised laboratory to check the quality of their finished products and must test and keep records of their products prior to releasing them for distribution and use.

22. Licensing authorities shall only issue trading licences to persons intending to carry out pesticide business including manufacturers, distributors, formulators, fumigators, and other pest controllers, etc. after such persons have produced a written approval or registration certificate from the Registrar.

23. Every registrant shall make records of all quantities of a pesticide product manufactured, imported, stored, used or sold by him and the records shall—

(i) be maintained for at least five years from the time it is made;

(ii) be made available to the Registrar annually;

(iii) include type of pesticide origin, port of entry, quantity imported and sold, purpose, etc.

24. Notwithstanding the provisions of section 20 (1) of the Act the label shall contain the following additional information—

(i) batch number, description of the physical form and purpose of the pesticide and shall include the common name of its active ingredient and trade mark or commercial name;

(ii) the essential instructions or directions on the use of the product in both English and Swahili languages and shall include—

(a) a statement of the intended use for the product, listing the crop and the pest situation for which it is officially registered or approved;

(b) information on recommended dosage rates, methods and timing of application for the above use;

(c) information on compatibility with other products or substances which may be proposed for use with the contents;

(d) a phrase stating the category and limitations of use of the product eg. FOR USE ONLY AS HERBICIDE. Also it should include a brief statement summarizing the main biological uses of the product for example, "For pre-emergent control of annual and broad-leaved weeds in cotton";

(e) expiry date for the product or the date of manufacture and the shelf-life;

- (f) any warnings or contra-indications intended to prevent misuse of the product and safety of users including practical antidote in case of accidental poisoning;
- (g) any special recommendations on storage conditions for the container and product. Directions for use shall be included in the main label on the container but may be supplied as a separate "Directions for Use" leaflet with each container or outer package. Use of graphics to convey relevant pesticide information may appear on the label;
- (h) the warning "SUMU (POISON)" written in bold red letters should appear at the top-centre of the label together with the skull and cross-bone drawing;
- (i) all bulk purchases shall bear a label as provided for in these Regulations, and shall further be accompanied by a document detailing the contents of the label. Where the said product is in small packs they must be labeled accordingly;
- (j) any additional information which cannot be accommodated on the label shall be included in the "directions for use" leaflet, for example practical advice on methods of preparing and using the product first aid and antidotes in case of poisoning and other necessary warnings.
- (iii) All the information on the label shall be accurate and free from any statements which cannot be substantiated or which could falsely inform a purchaser or user. The label shall not describe a product by such terms as "harmless, non-toxic, the best, superior or most effective".

25. Any organization handling pesticides shall provide their handlers with basic protective attire such as face-masks, goggles, aspirators, rubber gloves plastic or rubber aprons, rubber boots, overalls and caps.

- 26.—(i) Pesticides shall be packaged in clean and dry containers designed to provide protection against product deterioration, compaction, weight change or other spoilage. Containers must withstand all anticipated level of handling, storage, stacking, loading and unloading conditions and should not become adversely affected by changes in atmospheric conditions, pressure, temperature and humidity;
- (ii) no pesticide shall be transported or stored in such a way that it can easily come into contact with food or foodstuff;
- (iii) all pesticide storage areas shall be clearly marked with warning signs and the labels on the containers positioned so that they are clearly visible. Such an area shall be kept locked to avoid access of unauthorized persons; well ventilated and provided with fire-fighting equipment.

Protection of
handlers of
pesticides
Packings and
handling of
pesticides

- 27.—(i) Registrants shall be required to supply information on the safest and most practical way or ways of disposing any unwanted quantities of pesticides with the least possibility of polluting the environment;
- (ii) Registrants shall supply information on the safest and most practical ways of decontaminating and disposing of any used pesticide containers, with the least possibility of polluting the environment.

28.—(1) Upon the coming into operation of these Regulations any Transitional person engaged in the business of import or manufacture or sale of any pesticide, whereby that pesticide is not registered, shall within three months apply to the Registrar for registration of that pesticide.

(2) Where an application is made in terms of sub-Regulation (1) of this Regulation, the Registrar may grant provisional registration in respect of the pesticide and the application of Regulation 15 shall apply *mutatis mutandis* in respect of that pesticide.

SCHEDULES

SCHEDULE I

FORM PRC-1

CONFIDENTIAL

TROPICAL PESTICIDES RESEARCH INSTITUTE ARUSHA--TANZANIA
FOR OFFICIAL USE

The Registrar,
Pesticides Registration and Control,
P.O. Box 1024,
ARUSHA, Tanzania.

Applicant No.
Date Received:
Fees Receipt No.
Date Approved/Rejected
Rejection letter Ref. No.

APPLICATION FOR PESTICIDE REGISTRATION

(Under Regulation 9)

(To be filled in Triplicate)

1. Applicant's Details:

- (a) Name
- (b) Address
- (c) Address in Tanzania if different from above
- (d) Type of Organisation (Importer, Manufacturer, Distributor etc.)
- (e) Name and address of Manufacturer/Importer of the original pesticide
- (f) Name and address of firm's consultants

SCHEDULE I—(contd.)

SCHEDULE I—(contd.)

2. Details of the Product:

- (a) Common name(s) of the Pesticide.....
- (b) Trade name(s) or code number of the Pesticide.....
- (c) Chemical name(s) of the Pesticide (a.i.).....
- (d) Molecular formulae of the a.i(s).....
- (e) Molecular weight.....
- (f) Structural formulae of the a.i.....
- (g) Main active ingredient(s) content by weight/volume.....
- (h) List of adjuvant name(s) content by weight/volume.....
- (i) Type of Pesticide (e.g. weedkiller).....
- (j) Type of Formulation eg wettable powder.....
- (k) Physical properties:
- (i) Solubility of the pesticide in aqueous and/or organic solvents (metric units).....
- (ii) Emulsifiability/suspensibility (or emulsion stability).....
- (iii) Physical description (e.g. colourless crystals).....
- (iv) Wettability.....
- (v) Stability/comparability (eg. hydrolysed by alkali).....
- (vi) Spraying/dusting properties.....
- (vii) Moisture content.....
- (viii) Melting point.....
- (ix) Setting point.....
- (x) Boiling point.....
- (xi) Vapour pressure.....
- (xii) Accelerated storage.....
- (xiii) Flammability, etc.....
- (xiv) Active ingredient by weight/volume.....
- (xv) Acidity/Alkalinity.....
- (l) Tolerance limits for the characteristics in (k) above (where applicable).....
- (m) Estimated quantities of the product marketed during the last two years and the current year.....

3. Give a summary of the Product's Toxicology and other side effects:

- (a) Classification (in accordance with the WHO guidelines).....
- (b) Dermal and oral mammalian toxicity (LD₅₀).....
- (c) Two weeks cumulative mammalian toxicity of the Product.....

- (d) Mean acute dermal and oral toxicity of rat and one other animal species of the product.....
- (e) Allergenicity of the Pesticide.....
- (f) Special side effects on mammals, other organisms and the environment.....
- (g) A summary of possible hazards to people applying and handling the Pesticide as recommended.....
- (h) A summary of possible hazards to people and other animal species using treated products.....
- (i) Publications of the products toxicology.....
- (j) Residue tolerances data in substances treated with the pesticide where possible Internationally accepted levels should be given.....

4. Safety:

- (a) Recommended precautions in handling the pesticide product.....
- (b) Safety interval between treatment of animal or crop and harvest/consumption in both temperate and tropical climates.....
- (c) Recommended first aid in case of over exposure or poisoning.....
- (d) Recommended treatment after exposure.....

5. Analytical Methods:

- (Supply reprints, photocopies or authenticated texts) Quantitative determination of the pure a.i in technical material formulations and in contaminated biological materials.....

6. Containers:

- (a) Type and forms of containers used for storage of the pesticide product.....
- (b) Type of packaging for distribution.....

7. Biological Data:

- (a) Recommended field of applications (mention target pest and crop/animal).....
- (b) Suggested methods of applications.....
- (c) References of recommended use by authorised bodies in Tanzania.....

SCHEDULE I (contd.)

- (d) Reference of recommended use by authorized bodies outside Tanzania.....
- (e) Reference where the product has been used successfully/unsuccessfully showing the dosages applied (metric units).....
- (f) Persistence of the pesticide product in the environment (soil, water, plant and animal products).....
- (g) References of pest resistance to the pesticide product.....

8. The Label:

- (a) Appendix six copies of specimen or an exact of the label as it appears on the container or the label itself.....
- (b) Enclose specimens of any extra information pamphlets which are always.....

9. Chemical and Physical stability of the product in the recommended unopened containers under given storage conditions (mention shelf-life and expiry date).....

10. Premises (Attach sketch):

Physical address.....

Manufacturing room(s).....

Storage of: Technical materials.....

Adjuvants.....

Finished products.....

Standards.....

Antidotes.....

Air and other conditioners.....

Manufacturing equipment.....

Disposal of wastes.....

11. Name and Qualifications of the technical staff in charge:

12. Certificate:

I/We certify that the information given above is correct to the best of my/our knowledge using the information and scientific data available to me/us.

Signature of Authorised Officer(s)

Title:.....

Date:.....

for.....

I/We hereby enclose a cheque for..... being the payment of the application fee.

Date:..... Signature:.....

SCHEDULE II

FORM PRC-2

TROPICAL PESTICIDES RESEARCH INSTITUTE ARUSHA—TANZANIA
FOR OFFICIAL USE

The Registrar,
Pesticides Registration and Control
Division,
P.O. Box 3024,
ARUSHA, Tanzania.

Application No.....
Date Received:.....
Fees Receipt No.....
Date Approved/Rejected:.....

APPLICATION FOR A PERMIT TO IMPORT A PESTICIDE
(Under Regulation 7(i), 7(ii))

I/We.....
of Mailing Address.....

wish to import the pesticide.....

whose details are shown in the attached application Form PRC 1 the total quantity being.....
and FOB price being.....
The importation will be made during the period.....19.....
to.....19.....

Date:.....

Signature of Authorised Officer(s)

Title:.....
For (official stamp).....

SCHEDULE III

FORM PRC-3

TROPICAL PESTICIDES RESEARCH INSTITUTE
Pesticides Registration and Control Division P.O. Box 3024,
Arusha, Tanzania

PERMIT TO
IMPORT A
PESTICIDE
No.....

PERMIT TO IMPORT A PESTICIDE
Under Regulation 7(1), 7(2).

M/S.....
of (mailing address).....

is hereby authorised to import into the United Republic of Tanzania the following

Pesticides:

Common Name:.....

Trade Name:.....

SCHEDULE III—(contd.)

Chemical Name:
in quantity/quantities of
on one occasion/..... time, during the
period 19..... to 19.....
A receipt No. dated is herewith
attached,
Date: 19..... Signature:
Registrar

SCHEDULE IV

FORM PRC-4

TROPICAL PESTICIDES RESEARCH INSTITUTE
ARUSHA—TANZANIA

FOR OFFICIAL USE

Registrar
Pesticides Registration and Control
Division,
P.O. Box 3024,
ARUSHA,
Tanzania.

Application No.
Date Received Dated
Fee Receipt No.
Date Approved/Rejected:
Registration No.

APPLICATION FOR CLEARANCE OF USING AND ALTERING REGISTERED
PESTICIDES (S) FOR COMMERCIAL PURPOSES
Under Regulation 20(2)

Name of (Mailing Address)
wishes to use the following pesticides (mention common and trade name in brackets)
.....
and mixed in the following proportions
for the purpose of controlling the following pests
Date:
Signature of Authorised Officer (s)
Qualifications:
Title:

SCHEDULE V

FORM PRC-5

TROPICAL PESTICIDES RESEARCH INSTITUTE
Pesticides Registration and Control Division P.O. Box 3024, Arusha, Tanzania

CLEARANCE CERTIFICATE FOR
USING/ALTERING REGISTERED
PESTICIDE NO.

SCHEDULE Y—(contd.)

G.N. No. 193 (contd.)

CLEARANCE CERTIFICATE FOR USING OR ALTERING REGISTERED
PESTICIDE(S) FOR COMMERCIAL PURPOSES
Under Regulation 20(2)

Name of (Mailing Address)
is hereby authorised to use the following pesticide(s) (mention common and trade name
in brackets)
and mixed in the following proportions
for the purpose of controlling the following pests
Special conditions, if any
This Certificate is valid until

Signature:
Date:

SCHEDULE VI

FORM PRC-6

TROPICAL PESTICIDES RESEARCH INSTITUTE
Pesticides Registration and Control Division, P.O. Box 3024, Arusha, Tanzania

PESTICIDE REGISTRATION

CERTIFICATE NO.

PESTICIDE REGISTRATION CERTIFICATE

Under Regulation 14

Category of Registration
Common Name
Trade Name
Name and Address of Applicant
This is to certify that the above mentioned pesticide has been approved and registered
for sale or use in Tanzania under the conditions detailed below
This certificate is valid until

Signature:
REGISTRAR

Date: 19.....

SCHEDULE VII

FORM PRC-7

Ref. No.

TROPICAL PESTICIDES RESEARCH INSTITUTE

Pesticides Registration and Control Division, P.O. Box 3024, Arusha, Tanzania

CERTIFICATE OF ANALYSIS

Under Section 24(2)

I hereby declare that I have made a proper analysis of the sample of
submitted to the Pesticides Registration and Control Analytical Laboratory by
on 19....., the result of the analysis being as follows:

Remarks:

Name and Signature of Analyst

Designation:

Laboratory and Address

Date: 19.....

The Common Seal of the Institute was herein affixed in pursuance
of a resolution passed at a meeting of the Council duly convened and
held on the 29th day of March, 1984 and the same was so affixed in the
presence of:

H. Y. KAYUMBO,
Chairman

S. SIMON,
Director, Tropical Pesticides
Research Institute

I CONSENT.

J. B. MACHUNDA,
Minister for Agriculture and
Livestock Development

Dar es Salaam,
26 June, 1984

Appendix XII. List of pesticides registered in Tanzania.

Tropical Pesticides Research Institute

LIST OF PESTICIDES REGISTERED IN TANZANIA
(Made under Section 18 of the TPRI Act, 1979 and Pesticides
Control Regulations GN 193 of 1984)

1. PESTICIDES REGISTERED FOR GENERAL USE FOR FIVE YEARS (FULL REGISTRATION)

1A: INSECTICIDES:

Trade Name	Reg. No.	Common Name	Registrant	Usage
Actellic Super	IN/0002	Pirimiphosmethyl + Permethrin	ZENECA	Stored products against insect pests.
Fenpa 2.5 EC	IN/0130	Esfenvalerate	Sumitomo	Cotton against chewing and sucking pests.
Sumicidin 20 EC	IN/0126	Fenvalerate	Sumitomo	On cotton against American bollworms, spinybollworms.
Sumicidin 3 ULV	IN/0125	Fenvalerate	Sumitomo	On cotton against American bollworms, spiny bollworms.
X-Pel	IN/0131	Pyrethrins	Mansoor Daya	Household against mosquitoes.
1B: FUNGICIDES:				
Champion 50 WP	FU/0038	Cupric Hydroxide	Agrivel	On coffee against leafrust and CBD, on tomatoes against bacteria leafspot and late blight on cucumber against alternaria and downy mildew.
Cobox 50	FU/0044	Copper Oxychloride	BASF AG	Coffee, Vegetables against CBD, leafrust, downy mildew.
Kocide 101	FU/0045	Copper Hydroxide	Griffin	Coffee, tomatoes, beans and peanuts against CBD, and various fungal diseases.

Trade Name	Reg. No.	Common Name	Registrant	Usage
Cymbush 6 ED	IN/0132	Cypermethrin	ZENECA	On cotton against chewing and sucking insects.
Cymbush 2.5 ULV	IN/0026	Cypermethrin	ZENECA	Cotton, coffee, against antestia, berry borers, leaf miners, bollworms.
Decis 25 EC	IN/0032	Deltamethrin	Roussel - uclaf	Coffee, vegetables against chewing insect pests.
Decis D (3 + 120) ULV	IN/0141	Deltamethrin + Dimethoate	Roussel - uclaf	Cotton against bollworms, jassids, calidea.
Decis 0.3 ULV	IN/0142	Deltamethrin	Roussel - uclaf	Cotton against bollworms, jassids, calidea.
Dimecron 30SCW	IN/0036	Phosphamidon	Ciba-Geigy	Rice, cereals, vegetables against chewing sucking insect pests.
Dimecron 100 SCW	IN/0037	Phosphamidon	Ciba-Geigy	Rice, cereals, vegetables against chewing sucking insect pests.
Dursban 4E	IN/0042	Chlorpyrifos	Dow Elanco	Coffee, beans and in public health against chewing and sucking insect pests and mosquito control.
Ekalux 25 EC	IN/0043	Quinalphos	Sandoz	Cotton, beans, maize, vegetables against sucking insects.
Fastac 0.8 ULV	IN/0144	Alpha-Cypermethrin	Shell	On cotton against, bollworms leafeaters sucking pests.
Fenom C 170 ULV	IN/0145	Profenofos + Cypermethrin high Cis	Ciba-Geigy	Cotton against bollworms, jassids, calidea and judgus.

List of Pesticides Registered in Tanzania (1992/93)

Trade Name	Reg. No.	Common Name	Registrant	Usage
Fenpa 0.5 ULV	IN/0136	Esfenvalerate	Sumitomo	Cotton against chewing and sucking insect pests.
Flak Aerosol	IN/0053	Pyrethrins	Sapa Chem	Household against domestic insect pests.
Flyer solution	IN/0054	Pyrethrins + Malathion	Janus	Household against domestic insect pests.
Fyfanon 500g/l	IN/0057	Malathion ✓	Cheminova A/S	Cotton, tobacco and on pasture against chewing and sucking pests.
Icon 2.5 EC	IN/0146	Lambda Cyhalothrin ✓	ZENECA	Mosquitoes
Icon 10 WP	IN/0147	Lambda Cyhalothrin	ZENECA	Mosquitoes
Karate 5 EC	IN/0148	Lambda Cyhalothrin	ZENECA	On cotton against bollworms and aphids.
Karate 2ED	IN/0127	Lambda Cyhalothrin	ZENECA	On cotton against a wide range of insects.
Karate 0.6 ULV	IN/0128	Lambda Cyhalothrin	ZENECA	Cotton, beans, vegetables against chewing and sucking insects.
Novathion 500 EC	IN/0072	Fenitrothion ✓	Cheminova A/S	Coffee against leaf miner, chewing and sucking pests.
Nuvan 50 EC	IN/0074	Dichlorvos	Ciba-Geigy	Crop storage and public health against storage pests and household insects pests.
Polytrin 100 EC	IN/0135	Cypermethrin	Ciba-Geigy	On cotton, beans, vegetables against chewing and sucking insects and mites.

Tropical Pesticides Research Institute

Trade Name	Reg. No.	Common Name	Registrant	Usage
Polytrin Ulvaire 010	IN/0077	Cypermethrin	Ciba-Geigy	On cotton, beans and vegetables against chewing and sucking insects and mites.
Ripcord 25g/l	IN/0081	Cypermethrin	Shell Chem	Coffee, cotton, vegetable against chewing and sucking insects.
Ripcord 25g/l	IN/0080	Cypermethrin	Shell Chem	Coffee, cotton, against chewing and sucking insects.
Ripcord 1.8 ULV	IN/0079	Cypermethrin	Shell Chem	Cotton against sucking and chewing insects.
Rogor L40	IN/0083	Dimethoate	Isagro - Enichem Agricoltura	Cotton against chewing and sucking pests.
Sapa BHC 1% D	IN/0103	Lindane	Sapa Chem	Garden, hides & skins against chewing pests.
Sapa Carbaryl 5% D	IN/0090	Carbaryl	Sapa Chem	Crops, livestock, household against cutworms and beetles, animal ectoparasites, mosquitoes, cockroaches etc.
Sapa Carbaryl 85WP	IN/0091	Chloro- phenothane + carbaryl	Sapa Chem	Cotton, against chewing and sucking pests.
Sapa Cypermethrin 2.5% ULV	IN/0092	Cypermethrin	Sapa Chem	Coffee, tobacco, rice, sugarcane against chewing and sucking pests.
Sapa Diazinon 60 EC	IN/0093	Diazinon	Sapa Chem	Coffee, tobacco, rice, sugarcane against chewing and sucking pests.

List of Pesticides Registered in Tanzania (1992/93)

Trade Name	Reg. No.	Common Name	Registrant	Usage
Sapa Dimethoate 40 EC	IN/0096	Dimethoate	Sapa Chem	Various crops against aphids and mites.
Sapa Endosulfan 4D	IN/0097	Endosulfan	Sapa Chem	Maize, tobacco against stalk borers and chewing pests.
Sapa Endosulfan 25 ULV	IN/0099	Endosulfan	Sapa Chem	Cotton against chewing and sucking pests.
Sapa Endosulfan 35 EC	IN/0100	Endosulfan ✓	Sapa Chem	Maize, cotton, coffee against chewing insects, including armyworms.
Sapa Endosulfan 4G	IN/0098	Endosulfan	Sapa Chem	Maize against stalkborers.
Sapa Fenitrothion 50 EC	IN/0101	Fenitrothion	Sapa Chem	Coffee, cashew, tobacco storage against chewing and sucking pests and pests of stored products
Sapa Malathion 1%D	IN/0104	Malathion	Sapa Chem	Storage against storage pests.
Sapa Malathion 2%D	IN/0105	Malathion	Sapa chem	Storage against storage pests.
Sapa Malathion 5%D	IN/0106	Malathion	Sapa Chem	Storage pests.
Sapa Malathion 50 EC	IN/0107	Malathion	Sapa Chem	Storage pests.

Tropical Pesticides Research Institute

Trade Name	Reg. No.	Common Name	Registrant	Usage
Sapa Permethrin 5 ULV	IN/0110	Permethrin	Sapa Chem	Coffee, beans, cotton, vegetables, fruit trees against bollworms, aphids, thrips.
Selecron 720 EC	IN/0112	Profenofos	Ciba-Geigy	Coffee, vegetables against chewing and sucking insects.
Sevin 85 WP	IN/0113	Carbaryl	Rhone Poulenc	Crops, livestock, household against cutworms, beetles, ectoparasite domestic insect pests.
Sumicombi 1.8 D	IN/0154	Fenvalerate + Fenitrothion	Sumitomo	Against chewing and suc insects on various crops.
Sumicombi 3.0 D	IN/0155	Fenvalerate + Fenitrothion	Sumitomo	Against chewing and suc insects on various crops.
Sumithion 50 EC	IN/0117	Fenitrothion	Sumitomo	Various crops storage and public health against chewing and sucking insects, mosquitoes, flies and storage insects.
Sumithion-S	IN/0118	Fenitrothion + Fenvalerate	Sumitomo	Coffee, cotton, against chewing and sucking insects.
Sumithion 40 WP	IN/0129	Fenitrothion	Sumitomo	Used against mosquitoes (Malaria vector control).
SuScon Blue 140g/kg	IN/0137	Chlorpyrifos	Representative Agrichem	On sugarcane for the control of sugarcane grubs.
Velsicol Heptachlor 3 EC	IN/0058	Heptachlor	Velsicol	Various crops against termites and other soil pests.

List of Pesticides Registered in Tanzania (1992/93)

IIB: FUNGICIDES:

Trade Name	Reg. No.	Common Name	Registrant	Usage
Alto 100 SL	FU/0048	Cyproconazole	Sandoz	Coffee leaf rust.
Anvil 5 SC	FU/0050	Hexaconazole	ZENECA	Coffee against leaf rust.
Bayfidan 250 EC	FU/0051	Triadimenol	Bayer AG	Coffee against rust.
Bayleton 25% WP	FU/0002	Triadimefon	Bayer AG	Coffee, wheat against leafrust.
Baylan Universal 31.3DS	FU/0046	Triadimenol	Bayer AG	Seed dressing on wheat and barley against seed borne & soil borne diseases.
Bravo 500	FU/0003	Chlorothalonil	Fermenta ASC	Coffee, beans, tomatoes, etc, against CBD leaf rust, leaf spots blights.
Bronocot 10P	FU/0040	Bromopol	ZENECA	Cotton seed dressing.
Bronotak 10w/w	FU/0053	Bromopol	Schering AG	Cotton Seed dressing.
Copper Nordox	FU/0009	Cuprous Oxide	Nordox A/S	Coffee against CBD, leafrust.
Daconil 2787 75% WP	FU/0012	Chlorothalonil	Fermenta ASC	Coffee, beans, tomatoes, groundnuts against leafspot, CBD, leafrust, blight.
Dithane M-45	FU/0014	Mancozeb	Rohm + Haas	Vegetables, beans, fruits against anthracnose scab, lateblight, rust, mildews.

IIC: HERBICIDES:

Trade Name	Reg. No.	Common Name	Registrant	Usage
Nordox SD-45	FU/0023	Cuprous oxide	Nordox A/S	Seed dressing for cotton against bacterial blight and damping off.
Octave 50% WP	FU/0047	Prochloraz Manganese Complex	Schering AG	Coffee against CBD.
Perecopper	FU/0058	Copper-Oxychloride	Chemolimpex Hungarian Trading Co.	Coffee against CBD, leafrust.
Ridomil Mz 63.5 WP	FU/0028	Metalazyl Mancozeb	Ciba-Geigy	Potatoes, tomatoes against various fungal diseases.
Sapa Copper Oxychloride	FU/0030	Copper oxychloride	Sapa Chem	Coffee, beans, vegetables, grapes against blights, mildew, brown rot.
Topsin-M 40 ULV	FU/0035	Thiophanate	Nippon Soda	Rice, wheat, tobacco, vegetables against blast, leafspot, powdery, mildew, scab, blight, etc.
Topsin-M 70% WP	FU/0036	Thiophanate methyl	Nippon Soda	Rice, wheat, tobacco, vegetables against blast leafspot, powdery, mildews, scabs, blight, etc.
Actril DS	HE/0001	Loxynil 2,4 - D	Rhone Poulenc	Cereals against broad leaved weeds.
Asulox 40	HE/0008	Asulam	Rhone Poulenc	Sugarcane against grass weeds.

List of Pesticides Registered in Tanzania (1992/93)

Trade Name	Reg. No.	Common Name	Registrant	Usage
Atred 80 WP	HE/0009	Atrazine	Isagro - Enichem Agricoltura	Maize, sorghum, sugarcane against pre-post-emergence weeds.
Buctril MC	HE/0079	Bromoxynil	Rhone Poulenc	Barley against broadleaf weeds.
DP-36 EC	HE/0023	Propanil	Hodogaya Chem	Rice against grasses and annual weeds.
Fernimine 72	HE/0074	2,4-D Amine	ZENECA	Against broad leaved weeds in wheat, barley, oats, maize, sugarcane and grass lands.
Flex W 2SAs	HE/0075	Fomesafen	ZENECA	Against broad leaved weeds, including chinese, lantern in beans.
Fusilade Super 12, 5% EC	HE/0076	Fluazifopbutyl	ZENECA	Various crops against annual and perennial weeds.
Gallant 125 E	HE/0081	Haloxypol Ethoxy-Ethyl	Dow Elanco	On all broad leaf crops for control of grass weeds.
Gesapaxcombi 500 FW	HE/0030	Atrazine + Ametryne	Ciba-Geigy	Sugarcane, sisal, coffee bananas against weeds in general.
Helmamine 720 EC	HE/0003	2, 4-D	Helm AG	Cereals, sugarcane, sisal coffee against post-emergence weeds.
Laddock	HE/0040	Bentazone + Atrazine	BASF AG	Maize, sorghum, against broad leaved weeds and grasses.

Trade Name	Reg. No.	Common Name	Registrant	Usage
NABU 20% EC	HE/0045	Sethoxydim	Nippon Soda	Various broad leaved crops including cotton, beans, cereals etc against grasses.
Primagram 500 FW	HE/0050	Metachlor + Atrazine	Ciba-Geigy	Maize, sugarcane against grass and dicot weeds.
Reglone 200g/l	HE/0052	Diquat	ZENECA	Various crops against pre-planting and aquatic weeds.
Rhone Poulenc 2, 4-D Amine 72%	HE/0043	2, 4-D	Rhone Poulenc	Various crops against broad leaved weeds.
Rhone Poulenc 2, 4-D Ester	HE/0004	2, 4-D Ester	Rhone Poulenc	Cereals against broad leaved annual weeds.
Rilof S 395 EC	HE/0006	Piperophos	Ciba-Geigy	In rice, against broad leaved weeds.
Riselect	HE/0053	Propanil	Isagro - Enchem, Agriculture	Wheat, rice, potatoes against post emergence weeds.
Ronstar 25 EC	HE/0054	Oxadiazon	Rhone Poulenc	Rice, sunflower, against weeds in general.
Roundup 360g/l	HE/0055	Glyphosate	Monsanto	Coffee, citrus, bananas against all types of weeds particularly couch grass.
Sapa Paraquat 20 EC	HE/0056	Paraquat	Sapa Chem	Plantation crops against common broad leaved and annual weeds.
Satunil 60EC	HE/0077	Benthiocarb + Propanil	Kumiai Chem	On rice crops against gramineous cyerceous weeds etc.

List of Pesticides Registered in Tanzania (1992/93)

Trade Name	Reg. No.	Common Name	Registrant	Usage
Saturn 50 EC	HE/0070	Benthiocarb	Kumiai Chem	On rice crops against graminious cyerceous weeds etc.
Stam UT-8 EC	HE/0059	Propanil + Phenotial	Rohm and Haas	Rice against barnyard grass and cyperaceae (sedges).
Stomp 500 EC	HE/0061	Pendimethalin	Cyanamid	Sugarcane, cereals, cotton, sisal, rice against grasses and broad leaved weeds.
Touchdown	HE/0087	Glyphosate + Trimesium	ZENECA	Broad leaved, annual weeds and perennial grasses.
ACARICIDES:				
Bacdip	AC/0006	Quintifos	Agromed (T)Ltd	Cattle ticks.
Bayticol Pour On	AC/0005	Flumethrin	Agromed (T)Ltd	On cattle against ticks and other ectoparasites.
Cethion 101EC	AC/0007	Ethion	Cheminova	Cattle ticks.
Decatix 5%	AC/0008	Deltamethrin	Pitman-Moore	Cattle ticks and tse-tse.
Ectopor	AC/0009	Cypermethrin	Ciba-Geigy	Cattle ticks and tse-tse.
Sapatox 75 EC	AC/0003	Camphechlor	Sapa Chemical Industries.	Livestock against ticks.
Spoton 1%	AC/0011	Deltamethrin	Pitman-Moore	Cattle ticks and tse-tse.
Stelladone 300 EC	AC/0004	Chlorfenviphos	Ciba-Geigy	Farm animal against ectoparasites.
Supadip	AC/0012	Chlorfenviphos	Pitman-Moore	Cattle ticks.
Supona 100 EC	AC/0010	Chlorfenviphos	Shell	Cattle ticks and tse-tse.

IIE: NEMATOCIDES

Trade Name	Reg. No.	Common Name	Registrant	Usage
Basamid granular	NE/0001	Dazomet	BASF AG	Tobacco, coffee, vegetables, against soil pests i.e. nematodes, wireworms, millipedes, fungi, weeds.
Furadan 5G	NE/003	Carbofuran	FMC	Bananas coffee, tobacco, sugarcane, rice, maize, non-leafy vegetables aga soil insects, nematodes, foliar chewing, biting & sucking insects.
Miral 10 G	NE/0004	Isazophos	Ciba-Geigy	Bananas, cotton, sugarcane against nematodes and other soil insect pests.

II F: RODENTICIDES

Yasodion	RO/0004	Diphacinon	Datsuka Chem. Ltd.	Against rats and mice in rice, sugarcane, and maize.
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III: PESTICIDES REGISTERED UNDER RESTRICTED REGISTRATION

IIIA: INSECTICIDES

Trade Name	Reg. No.	Common Name	Registrant	Usage	Restriction
Actellic 40 WP (Tech.)	RE/0043	Pirimiphos-methyl	ZENECA	For formulation.	N/A
Ambush 25 WP (tech.)	RE/0031	Permethrin	ZENECA	For formulation.	N/A
Fyfanon (tech)	RE/0034	Malathion	Cheminova A/S	For formulation.	N/A
Novathion (tech)	RE/0035	Fenitrothion	Cheminova A/S	For formulation.	For formula purposes or

Tropical Pesticides Research Institute

Trade Name	Reg. No.	Common Name	Registrant	Usage	Restriction
Sapa Aldrin 40 WP	RE/0015	Aldrin	Sapa Chem	Soil against soil insects, ants, termites etc.	Soil use only.
Sapa Dieldrin 18% EC	RE/0022	Dieldrin	Sapa Chem	Coffee, bananas, sisal terminates, weevils, grubs and borers.	Soil use only.
Sapa Ethylene Dibromide 45%	RE/0023	Ethylene Dibromide	Sapa Chem	Soil storage against soil pests.	Soil use and godowns TPRI approved.
Sapa Methyl Bromide 98%	RE/0024	Methyl Bromide	Sapa Chem	Tobacco, nurseries against soil insect pests.	Soil use only TPRI approved users.
Sumicidin (tech.)	RE/0036	Fenvalerate	Sumitomo	For formulation.	For formulation purposes only.
Sumithion (tech)	RE/0037	Fenitrothion	Sumitomo	For formulation.	For formulation purposes only.
Thionex 70% D	RE/0041	Endosulfan (tech)	Sapa Chem.	For local formulation.	For formulation purposes only.
Velsicol Chlordane 8EC	RE/0001	Chlordane	Velsicol	Soil against grubs, termites ants, and crickets.	Soil use only.
III B: FUNGICIDES					
Celcure K33	RE/0030	Copper Chromium + Arsenic	Rentokil	For treatment timber of installation against fungal decay.	Timber treatment only.
Ethylene Dibromide	RE/0047	Ethylene Dibromide	Sapa Chem	Formulation purpose.	N/A
Nemacur 10 G	RE/0029	Phenamiphos	Bayer AG	Various crops against nematodes, aphids, mealybugs.	Larger scale farmers only.

Appednix XIII. Pesticide import permits issued by the TPRI between 1986 and 1993.

APPENDIX IV-

PESTICIDES IMPORT PERMITS ISSUED BY TPRI (1986 - 1993)

A: INSECTICIDES

TRADE NAME	COMMON NAME	REG. STATUS	1986	1987	1988	1989	1990	1991	1992	1993	TOTAL
Aatifon	Diclofenthion + Thiram	Exp.		1,215Kgs							
Actelic 21D	Pirimiphos-Methyl	Prov.	1,000Kgs								
Activil Acryl Paint	Aldrin + Dichlorvos							100,000Kgs			10
Alfacron 10Xwp	Azaxethipos		500Kgs				50Kgs				
Andro	Hydranethylnon							4,350Kgs	2,000Kgs		
Basudin 500EC	Diazinon							1,000Kgs			
Baygon Aerosol	Propoxur							1,000Lts			
Baygon 50Xwp	Propoxur								450Lts		
Baygon 1XDP	Propoxur							2,000Kgs			
Blotic 35XEC	Propetazphos								2,040Kgs		
Bulldog 0050LV	Cyfluthrin I + L					2,000Lts	225,000Lts				22
Cybolt 1.7XULV	Flucythrinate				50,000Lts			500Lts	100,000Lts		10
Cyabush 6ED	Cypermethrin										
Cyabush 2.50LV	Cypermethrin							10,750Lts			
Danfin 2P	Methacrifos				205,000Lts			103,000Lts			30
Danfin 950EC	Methacrifos				2,100Kgs						
Decis EC 25	Deltamethrin		200Lts								
Decis 0.5XULV	Deltamethrin								25,200Lts		
Dieldrex 10XEC	Dieldrin				205,000Lts						20
Dimecron 50SCW	Phosphamidon					113,000Lts		5,000Lts			11
Dipterex 2.5GR	Trichlorphon							6,000Lts	12,000Lts	1,000Lts	
Doom Verain Powder	Sevin	EXP						10,000Kgs			
Dual 960EC	Metolanchlor	PR				500Kgs					
Dursban 4E	Chlorpyrifos								1,000Lts		
Etalux 25EC	Quinalphos					302,000Lts		172,616Lts			50
Ethylenedibronide	Ethylenedibronide	EE				8,000Lts					
Tech.	Tech.						63Tons	63Tons	291.2Tons		4

TRADE NAME	COMMON NAME	REG. STATUS	1986	1987	1988	1989	1990	1991	1992	1993	TOT
Famid 80XWP	Diaxcarb	EXP	500Kgs	-	-	-	-	-	-	-	50
Fastac 0.8XULV	Alphacypermethrin	PR	-	-	-	-	-	20,000Lts	-	-	20,000
Hatari Insect Killer	Fenitrothion+Tetraethrin	EXP	-	-	-	-	-	-	12,672	-	12,672
Karate 5XEC	Lambda Cyhalothrin	PR	-	-	-	-	-	-	10,000Lts	-	10,000
Karate 2ED	Lambda Cyhalothrin	-	-	-	-	-	-	22,500Lts	33,000Lts	-	55,500
Karate 0.8XULV	Lambda Cyhalothrin	-	-	-	50,000Lts	-	-	95,000Lts	125,000Lts	-	273,000
Magtox	Aluminium Phosphide	EXP	-	14.7Kgs	-	-	-	-	-	-	14.7
Marshal 350STD	Carbosulfan	-	-	-	-	-	-	2.7Tons	10.8Tons	-	13.5
Mel-Cypermethrin 1.8ULV	Cypermethrin	PR	-	-	-	-	-	5,000Lts	39,000Lts	-	44,000
Meth-O-Gas	Methyl Bromide	-	-	-	-	-	-	243Kgs	595.5Kgs	-	838.5
Neocidal Diazinon 60XEC	Diazinon	-	-	-	-	-	-	5,000Lts	-	-	5,000
Nogos 50XEC	Dichlorvos	-	-	-	2,100Lts	-	-	-	-	-	2,100
Nogos Ulvair 250	Dichlorvos	-	-	-	-	-	-	-	3,000Lts	-	3,000
Novathion 50XEC	Fenitrothion	-	-	-	-	-	-	-	20,3910Lts	-	203,910
Nurelle 1.8XULV	Cypermethrin	-	-	-	-	-	-	100Lts	64,000Lts	-	64,100
Nuvacron 40SCW	Monocrotophos	-	-	-	-	-	-	100Lts	100Lts	-	200
Nuvan 50XEC	Dichlorvos	-	200Lts	-	3,000Lts	-	1,000Lts	14,700Lts	4,620Lts	2,200Lts	25,720
Orthene 75XSP	Acephate	EXP	-	-	-	-	-	-	5Kgs	-	5
PBI 25X	Pyrethrum Extract	-	-	-	-	-	-	250Kgs	-	-	250
Pesguard PS 201	d-Allethrin+d-Phenothrin	-	-	2,000Lts	-	3,500Lts	12,000Lts	-	-	2,500Lts	28,000
Phostoxin	Aluminium Phosphide	EXP	-	-	-	-	-	-	583.2Kgs	-	583.2
Polytrin 1.8XULV	Cypermethrin	PR	-	-	-	-	110,000Lts	110,000Lts	-	-	220,000
Red Cane	Tetraethrin + Fenitrothion	EXP	-	-	-	-	-	-	216Kgs	-	216
Red Killer(Aerosol)	Fenitrothion	EXP	-	-	-	-	-	-	150Lts	-	150
Rhone Poulenc Malathion	Malathion	PR	-	-	-	-	13.3 Tons	-	-	-	13.3
Ripcord 10XEC	Cypermethrin	-	-	-	15,000Lts	-	-	-	-	-	15,000
Ripcord 2.5XULV	Cypermethrin	-	-	-	-	-	11,600Lts	-	-	-	11,600
Ripcord 1.8XULV	Cypermethrin	-	-	-	285,000Lts	10,000Lts	284,000Lts	-	-	-	579,000
Safrotrin 50XEC	Propetamphos	-	200Lts	-	-	-	-	330,500Lts	-	-	330,700
Safrotrin 2XD	Propetamphos	-	-	-	-	-	225Tons	-	-	-	225

TRADE NAME	COMMON NAME	REG. STATUS	1986	1987	1988	1989	1990	1991	1992	1993	TOT
Sapa Carbaryl 85X WP	Chlorophenothane+Carbaryl	- - -	-	-	-	-	-	5Tons	-	-	-
Sapa Dimethoate	Dimethoate	- - -	-	-	-	-	-	15,000Lts	-	-	11
Satisfar 25X D	Strimfos	- - -	-	-	-	-	-	-	-	-	17
Selecron 720 EC	Profenofos	- - -	-	-	-	-	-	75,000Lts	-	231,000Lts	61
Sevin 85X WP	Carbaryl	- - -	-	-	-	-	-	-	5,000Lts	4,000Lts	-
Solfac 10X WP	Cyfluthrin	EXP	-	-	1,600Kgs	-	-	-	-	-	-
Strike Cockroach Killer	Dichlorvos + DDVP	EXP	-	-	-	500Kgs	-	-	-	-	-
Somicidin 20X EC	Fenvalerate	FULL	-	-	28,000Lts	-	-	-	15,000Lts	-	4
Somicidin 31ULV	Fenvalerate	- - -	-	-	375,000Lts	-	-	180,000Lts	60,000Lts	-	61
Sumithion 80X EC	Fenitrothion	EXP	-	-	-	26,500Lts	14,000Lts	-	-	-	4
Sumithion 50X EC	Fenitrothion	PR	-	-	-	26,100Lts	18,000Lts	-	14,000Lts	31,500Lts	8
Sumithion 40X WP	Fenitrothion	- - -	750Tons	-	-	107Tons	-	-	-	-	-
Sapa Carbaryl 85X WP	Chlorophenothane+Carbaryl	EXP	-	-	-	500Kgs	-	-	-	-	-

TRADE NAME	COMMON NAME	REG. STATUS	1986	1987	1988	1989	1990	1991	1992	1993	TOTL
Famid 88XYP	Diazcarb	EXP	500Kgs	-	-	-	-	-	-	-	50
Fastac 0.8XULV	Alphacypermethrin	PR	-	-	-	-	-	20,000Lts	-	-	20,000
Hatari Insect Killer	Fenitrothion+Tetramethrin	EXP	-	-	-	-	-	-	12,672	-	12,672
Karate 5XEC	Lambda Cyhalothrin	PR	-	-	-	-	-	-	19,000Lts	-	19,000
Karate ZED	Lambda Cyhalothrin	-	-	-	-	-	-	22,500Lts	33,000Lts	-	555,000
Karate 0.5XULV	Lambda Cyhalothrin	-	-	-	50,000Lts	-	-	95,000Lts	128,000Lts	-	273,000
Magtox	Aluminium Phosphide	EXP	-	14.7Kgs	-	-	-	-	-	-	14
Marshal 350SYD	Carbosulfan	-	-	-	-	-	-	2.7Tons	10.8Tons	-	13.5
Mel-Cypermethrin 1.8ULV	Cypermethrin	PR	-	-	-	-	-	5,000Lts	39,000Lts	-	44,000
Meth-O-Gas	Methyl Bromide	-	-	-	-	-	-	243Kgs	595.5Kgs	-	838
Neocidal Diazinon 60XEC	Diazinon	-	-	-	-	-	-	5,000Lts	-	-	5,000
Nogos 50XEC	Dichlorvos	-	-	-	2,100Lts	-	-	-	-	-	2,100
Nogos Ultra 250	Dichlorvos	-	-	-	-	-	-	-	3,000Lts	-	3,000
Novathion 50XEC	Fenitrothion	-	-	-	-	-	-	-	20,3910Lts	-	203,910
Nurelle 1.8XULV	Cypermethrin	-	-	-	-	-	-	100Lts	64,000Lts	-	64,100
Nuvacron 40SCW	Monocrotophos	-	-	-	-	-	-	100Lts	100Lts	-	200
Nuvan 50XEC	Dichlorvos	-	200Lts	-	3,000Lts	-	1,000Lts	14,700Lts	4,620Lts	2,200Lts	25,720
Orthene 75XSP	Acephate	EXP	-	-	-	-	-	-	5Kgs	-	5
PBI 25X	Pyrethrum Extract	-	-	-	-	-	-	250Kgs	-	-	250
Peeguard PS 201	d-Allethrin+d-Phenothrin	-	-	2,000Lts	-	3,500Lts	12,000Lts	-	-	2,500Lts	20,000
Phostoxin	Aluminium Phosphide	EXP	-	-	-	-	-	-	503.2Kgs	-	503.2
Polytrin 1.8XULV	Cypermethrin	PR	-	-	-	-	110,000Lts	110,000Lts	-	-	220,000
Red Cans	Tetramethrin + Fenitrothion	EXP	-	-	-	-	-	-	216Kgs	-	216
Red Killer(Aerosol)	Fenitrothion	EXP	-	-	-	-	-	-	150Lts	-	150
Rhone Poulenc Malathion	Malathion	PR	-	-	-	-	13.3 Tons	-	-	-	13.3
Ripcord 10XEC	Cypermethrin	-	-	-	15,000Lts	-	-	-	-	-	15,000
Ripcord 2.5XULV	Cypermethrin	-	-	-	-	-	11,000Lts	-	-	-	11,000
Ripcord 1.8XULV	Cypermethrin	-	-	-	285,000Lts	10,000Lts	284,000Lts	-	-	-	579,000
Safroth 50XEC	Propetamphos	-	200Lts	-	-	-	-	330,500Lts	-	-	330,700
Safroth 2XD	Propetamphos	-	-	-	-	-	225Tons	-	-	-	225

Appednix XIII. Pesticide import permits issued by the TPRI between 1986 and 1993.

APPENDIX IV-

PESTICIDES IMPORT PERMITS ISSUED BY TPRI (1986 - 1993)

A: INSECTICIDES

TRADE NAME	CHEMICAL NAME	REG. STATUS	1986	1987	1988	1989	1990	1991	1992	1993	TO
Actifon	Diclofenthion + Thiran	Exp. Prov.		1,215Kgs							
Actelle 2XD	Pirimiphos-Methyl		1,000Kgs					100,000Kgs			10
Activil Acryl Paint	Aldrin + Dichlorvos						50Kgs				
Alfacron 10Kwp	Azaathipbos		500Kgs								
Andro	Hydranethylnon							4,350Kgs	2,000Kgs		
Bagudin 600EC	Diazinon							1,000Kgs			
Baygon Aerosol	Propoxur							1,000Lts			
Baygon 50Kwp	Propoxur								450Lts		
Baygon 1XDP	Propoxur							2,000Kgs			
Blotic 35XEC	Propetamphos								2,040Kgs		
Bulldog 0050LV	Cyfluthrin I + II					2,000Lts	225,000Lts				24
Cybolt 1.7XUGV	Flucythrinate							500Lts	160,000Lts		10
Cyabush 620	Cypermethrin				50,000Lts						10
Cyabush 2.50LV	Cypermethrin				285,000Lts			18,750Lts			10
Danfin 2P	Methacrifos				2,100Kgs			103,000Lts			38
Danfin 950EC	Methacrifos										
Decis EC 25	Deltamethrin		200Lts								
Decis 0.5XULV	Deltamethrin								25,200Lts		
Dieldrex 18XEC	Dieldrin				265,000Lts						20
Diacron 50SCV	Phosphamidon					113,000Lts		5,000Lts			11
Dipterex 2.5GE	Trichlorphon							6,000Lts	12,000Lts	1,000Lts	1
Doom Verain Powder	Sevin	XIP						10,000Kgs			1
Dual 950EC	Metolanchlor	PE				500Kgs					1
Dursban 4E	Chlorpyrifos								1,000Lts		
Italux 25EC	Quinalphos					382,000Lts		172,616Lts			50
Ethylendibromide	Ethylendibromide	EE				8,000Lts					
Tech.	Tech.						63Tons	63Tons	291.2Tons		4

TRADE NAME	COMMON NAME	REG. STATUS	1986	1987	1988	1989	1990	1991	1992	1993	TOT
Sapa Carbaryl 85X WP	Chlorophenothane+Carbaryl	- - -	-	-	-	-	-	5Tons	-	-	-
Sapa Dimethoate	Dimethoate	- - -	-	-	-	-	-	15,000Lts	-	-	11
Satisfar 25X D	Etrinfos	- - -	-	-	-	-	-	-	-	-	11
Selecron 720 EC	Profenofos	- - -	-	-	-	-	-	75,000Lts	-	231,000Lts	61
Sevin 85X WP	Carbaryl	- - -	-	-	-	-	-	-	5,000Lts	4,000Lts	1
Solfac 10X WP	Cyfluthrin	EXP	-	-	1,600Lts	-	-	-	-	-	-
Strike Cockroach Killer	Dichlorvos + DDVP	EXP	-	-	-	500Lts	-	-	-	-	-
Suicidin 20XEc	Penvalerate	FULL	-	-	28,000Lts	-	-	-	15,000Lts	-	4
Suicidin 3XULV	Penvalerate	- - -	-	-	375,000Lts	-	-	100,000Lts	60,000Lts	-	61
Suathion 80X EC	Fenitrothion	EXP	-	-	-	26,500Lts	14,000Lts	-	-	-	4
Suathion 50X EC	Fenitrothion	PR	-	-	-	26,100Lts	18,000Lts	-	14,000Lts	31,500Lts	81
Suathion 40X WP	Fenitrothion	- - -	750Tons	-	-	107Tons	-	-	-	-	-
Super Dose Insect Killer	Permethrin + Deltamethrin	EXP	-	-	-	500Lts	-	-	-	-	-

Appendix XIV. List of pesticides formulated in Tanzania by a) SAGA and b) TWIGA Chemical Industries between 1986 and 1990 (Source: TPRI, Arusha, 1995).

A. SAGA:

SAGA ALDRIEN	- ALDRIN 40%
SAGA BHC	- BHC 1% DUST
SAGA CARBARYL	- CARBARYL 5% DUST
SAGA COTTON DUST	- DDT 10%; BHC 3%
SAGA DAWA YA PAMBA	- DDT 75%; DIMETHOATE 40 %
SAGA DDT	- DDT 5% DUST
SAGA DDT	- DDT 10% DUST
SAGA DIMETHOATE	- DIMETHOATE 40%
SAGA ENDOSULFAN	- ENDOSULFAN 40%
SAGA ETHYLENE DIBROMIDE	- ETHYLENE DIBROMIDE
SAGA LIQUID INSECTICIDE	- PYRETHRIN
SAGA TOBACCO SEEDBED COCKTAIL	- ALDRIEN 40% + DIMETHOATE + EDB + ENDOSULFAN + SEEDBED DRENCH

B. TWIGA:

AGROCIDE	- BHC 3%, 7%, AND 10%
ALDRIN	- ALDRIN 2.5% AND 40%
BHC	- BHC 6.5% AND 26% WP
CYMBUSH	- 0.5% CYPERMETHRIN
DIDIMAC	- DDT 5%, 10%, AND 25%
DIELDRIN	- DIELDRIN 50%
GAMMALIN	- LINDANE 0.5% AND 1%
KILPEST	- MALATHION 50%
KYNAKIL	- MALATHION 1%, 2%, AND 5%
KYNADRIN	- DIELDRIN 2.5% AND 18%
ACTELIC SUPER DUST	- PERMETHRIN/PIRIMIPHOS METHYL)
ACTELIC	- PIRIMIPHOS METHYL 50% EC
SEEDBED DRENCH	- ENDOSULFAN/MACOZEB)
SEVIN	- CARBARYL 10%
SUMITHION	- FENITROTHION 50%
THIODAN	- ENDOSULFAN 4%, 8%, AND 35%
THIODAN	- ENDOSULFAN 25% ULV

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