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RISK REDUCTION IN AGROCHEMICALS DEVELOPMENT IN THE AFRO-ARAB REGION

XP/INT/96/012

VOLUME 2

Proceedings of the Expert Group Meeting on Risk Reduction in Agrochemicals Development in the Afro-Arab Region
Port Louis, Mauritius, 4-6 December 1996*

Prepared for the Governments of the participating countries of the Afro-Arab Region by the United Nations Industrial Development Organization

Based on the work of K. Ziller

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* This document has not been edited.

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PREFACE

Afro-Arab region is an important consumers of agrochemicals and with the population increasing at an average annual rate of 2-3 % the food security is becoming a major concern for the whole region. While there are many fresh water resources available in the area, the availability and access to irrigation water is becoming a critical factor in agricultural inputs along with soil management, improved crop varieties and above all the quality and safety of agrochemicals including fertilizers.

Many countries in the Arab region have already embarked on increasing their pesticide formulation capacity and at the same time some countries, both in the Afro and the Arab regions are seriously moving towards Integrated Pest Management (IPM) as a means for reducing dependance on man-made chemicals.

Despite the problems associated with the production and use of agrochemicals, just as in other parts of the world, in the Afro-Arab region also the consumption of pesticides is on the increase. While in the developed world , the trend is towards 'low volume/high value' pesticides and their formulations, the majority of the Afro-Arab countries still rely on old generation pesticides and their traditional formulations such as WP, EC which tend to be 'high volume/low value' pesticides and many of them highly toxic and persistent pesticides. In addition, the use of fertilizers are also on the increase and the leaching of nitrates and phosphates are causing problems of eutrophication blocking the waterways and harming aquatic life. Another major problem facing these countries are accumulation of obsolete and date expired pesticides and their formulations stored in highly hazardous conditions causing damage to human and animal life and the environment.

While some of the problems related to handling of agrochemicals are being dealt with either on a national or some at sub-regional levels there are no concerted efforts on a regional basis so as to catalyze capacity building in the region towards promoting risk reduction in agrochemicals development. A network such as the proposed Afro-Arab network would bring many countries of the region together to discuss and exchange the problems and experience in this very important complex and multidisciplinary field. In 1991 many African and Arab countries during an Expert Group Meeting at Brussels on development of integrated safety guidelines on pesticide formulation in developing countries requested UNIDO to set up a mechanism for setting up of a network on risk reduction in agrochemicals development similar to the Regional Network on Pesticides for Asia and the Pacific called RENPAP.

In order to obtain first hand information on the status of agrochemicals development in selected countries in the Afro-Arab Region, UNIDO in 1995 sent a delegation to selected countries in the Afro-Arab Region. The UNIDO Mission met representatives of various Ministries dealing with pesticides, research institutions, NGO and Women organizations. Based on the findings, two reports, one for the Arab region and one for the African region, were submitted. In addition, a draft project proposal was prepared giving a strategy for setting up of the network with objectives, outputs, activities and inputs. In order to discus the reports and the project proposal an Expert Group Meeting hosted by the Ministry of Health, Government of Mauritius, was held at Mauritius from 4-6 December , 1996.

(preface continuation)

The papers compiled in this volume represent the mainly unedited country papers delivered by the various participants of the Expert Group Meeting in Mauritius.

In some cases retyping and/or slight changes of the wordings or the sentences were necessary in order to facilitate understanding the meaning.

Whilst most of the annexes are included in this volume, there were some listings or legal texts in languages other than English that could not be read or translated.

This volume is mainly thought as a temporary reference until the Network would be established and "Electronic Networking" is available to the participants and also other interested parties. A pilot project on electronic networking could possibly be started within a few months with the aim of interlinking all interested parties and providing numerous kind of pesticide related information. Such infrastructure would of course tremendously speed up the exchange of information and substantially cut on costs of manually copying and mailing reports, data or other documents inluding visual material .

PESTICIDES AND PESTICIDE INDUSTRY IN ALGERIA

INTERREGIONAL EXPERT GROUP MEETING ON RISK REDUCTION IN THE DEVELOPMENT IN AGROCHEMICALS IN THE AFRO-ARAB REGION

PORT LOUIS , MAURITIUS 4 - 6 DECEMBER 1996.

From Mr. BADA MOHAMED HADI
TECHNICAL DIRECTOR
ASMIDAL - ALGERIA.

November 1996

CONTENT

SITUATION OF PESTICIDES INDUSTRY IN ALGERIA

ABSTRACT

Pesticides Industry exists in Algeria since more than fifty years. The activity of production of pesticides is managed by the company ASMIDAL issued from SONATRACH in 1985.

ASMIDAL disposes of four sites where pesticides and domestic products are produced. Two of these sites (BARAKI and BENI MERED) produce liquid and powdered pesticides. The other sites (MASCARA and GOSBAT) produce insecticides for domestic use.

ASMIDAL produces more than twenty pesticides with imported raw material and using local charges.
Each pesticide in the market disposes a label on which lay specifications of the product, the toxicity, types of cultures to use, directions for use ... .

Regarding the importance of risk from these products, Algeria published regulations executive decrees to protect the environment. Before we use pesticides, it is necessary to obtain approval from a commission composed of members from the Ministry of Health, the Industry, the Environment-protection, the trade, the institute of vegetables protection and the representing of toxicology and biological committees.

This commission has all power concerning the manufacture, the trade and use of new pesticides in the country.

Before giving any approval, the institute of vegetables protection makes all tests. These tests need more than two years. When all the tests are agreed, the commission gives approval for ten years (A.P.V).

Protection of environment is taken in charge by the Government. There is one department in the Ministry of interior which takes in charge all the problems concerning the protection of environment. Algeria publishes since 7976 regulations and decrees to protect environment. For the reduction of risk of using pesticides there is a regulation published in 1987 and an executive decree in December 1995.

I. SITUATION OF THE PESTICIDES INDUSTRY

The industry of pesticides in Algeria dates back in the years 1940 / 1950. Bearing on mind the rich Algerian agricultural soil and expected harvests, the pesticides as well as chemical fertilizers have been introduced in Algeria since 1940/1950. Three plants have been erected in order to make the formulation and the conditioning (packing). Two other plants are erected during period 1970 / 1980 for domestic use.

This industry of pesticides did not know any significant development compared to the other sectors of industry. The development of pesticides started to take a real form after 1988 but could not be achieved because of the lack of financial means and partners. However, numerous actions have been undertaken in order to achieve this technology and recognize the needs of the market.

1. The achievement (know-how) of the control of quality
2. The achievement (know-how) of the existing formulation
3. Introduction of inert charges available in Algeria
4. Formulation of new products in laboratories with assistance of foreign companies.

Algeria imported all raw material to formulate the pesticide products and also some of finished products like herbicides.

Capacity of formulated all product listed in the catalogue are used now at less than 50 %.

Right now the pesticide units can formulate more than twenty products.

ASMIDAL produced during the last five years (1990 to 1995) the quantity here after:

	YEARS					(Units: tonnes)
PRODUCTS	1990	1 991	1992	1993	1994	1995
INSECTICIDES	4592	2424	1693	2321	5386	233
FUNGICIDES	3296	3498	2310	4623	4275	2263
DOMESTICS	444	326	406	597	315	364

PRODUCTS	YEARS					(Units : 1000)
	1990	1991	1992	1993	1994	1995
AEROSOLS	7983	8175	6869	6312	6549	7328

In 1993 the Algerian government decided to inventory all quantities of pesticides which reached their expiry dates.

However the sector of domestic insecticides (Aerosols) knew an important development.

Today the operational capacities are about 12 Millions units per year in one shift.

II. THE USE OF PRODUCTS :

The restructuring of the agricultural sector in 1986 had a positive influence regarding the use of pesticides in order to increase the productivity of different cultures.

As a matter of fact, the volume of sales achieved after the restructuration increased significantly.

Unfortunately, this evolution has not continued regarding numerous facts.

The pesticides remain a key element, as well as fertilizers, in order to achieve the number one goal, which is to reduce the cost of food consumption.

ASMIDAL customers are :

- Agricultural sector
- Conversion industry
- Local communities
- Public administration and private individual.

III. DEVELOPMENT PROSPECTS :

Actually Algeria is in its mutation phase on regarding the goals fixed by the Algerian authorities concerning the agricultural sector, the pesticide industry will have to play an essential role to reach these fixed aims.

In order to prepare this industry to face the potential market and to control all the actives substances it has been decided, in a primary phase, to subsidize the industry of pesticides.

These subsidiaries will allow a better control of the market (by knowing its needs, or evaluating and determining the list of vegetal diseases.

To adapt the units to this market and to insure their development program in particular for :

- Growing cereals
- Intensive farming and market culture
- Wine growing.

And always be aware of technological developments of the production of high-concentration products, easy to use (liquid), where there is no need for special equipment that respond to a larger spectrum than those in use actually.

In the frame of above, and regarding the Algerian regulations for partnership, the ASMIDAL company is willing to take into consideration any offer in the sense of participation in the subsidiary for the promotion of this industry, bearing in mind that the market exists and that the big part of installations is operational.

All facilities are done now for the investment in Algeria with the last publication of commercial law . This law gives all guarantees. The facilities can be obtained from APSI (Agency for Promotion of the Investment).

IV. VALID LAWS AND REGULATIONS :

After the industrial development of Algeria during the 1970's and 1980's, and regarding the international agreements concerning the protection of environment, Algeria published, since 1976, different decrees, laws and orders.

Among these regulations are the following :

- Law regarding the protection of the environment 1983
- Law regarding the protection of pesticides 1987
- Decree regarding of the impact studies 1990
- Decree regarding the liquid rejection 1992
- Decree regarding the inventory degree of pollution for the superficial water 1993
- Decree regarding the atmospheric rejection of smoke 1993
- Decree regarding of the control of products pesticide for agricultural use 1995.

The last decree fixed the circumstances of recognition, the manufacture, the handling and the use of pesticide products for agriculture and fixed also the composition and the function of the commission for pesticide products.

Concerning the production of pesticides in Algeria, all products are identified and labels provide all information on the active substances: concentration, form, chemical family, chemical formula, LD 50, maximum content in residues, packing, direction for use, interdiction of use, action on auxiliaries, action on insects, persistence of action, cultures, depredators, doses/ha, expiry date.

V - REDUCTION RISK IN AGROCHEMICALS DEVELOPMENT

Regarding the needs of Afro-Arab countries on agricultural product, the pesticides like the fertilizers should be used. Using these products must respect some rules for reduce the pollution of soil and assure protection for farmers and consumers.

For that it is necessary to develop I.P.M. in each country depending on their needs and level of pesticide products. This I.P.M. should be one of the goals for each government. Increase the productivity of the agriculture and in the same time to protect their country particularly from expired raw materials or raw materials with toxic heavy metal.

Added to that Afro-Arab network would be the best way for those countries to exchange all information about these products and to promote the exchange of experience about the manufacturing and the destruction of the expired products for Algeria focal point would be the Institute of Vegetables Protection (I.N.P.V).

Country Report

ETHIOPIA

Risk Reduction in the Development of Agrochemicals in Ethiopia

Berhanu Gebremedhin[1]

Abstract

In Ethiopia agriculture contributes over 46 percent of the GDP, accounts for 90 percent of the country's export earnings and employs 65 percent of the labour force.

At present the total cultivated land in the country is approximately 7.55 million out of which 7.2 million is cultivated by means of rain and the remaining 350,000 is irrigated.

The country has issued a special pesticide Decree (No. 20/1990) in September 1990, which assigned overall pesticide registration and control responsibility to the Ministry of Agriculture (MOA), Pesticide Registration and Control (PRC) office. But the registration became effective since July 7, 1996 and it has registered 45 pesticides since then. According to UNIDO's plan if the Afro-Arab region risk reduction in agro-chemicals net work is set up, Ethiopia can actively participate as an information centre.

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[1] Ministry of Agriculture, P.O. Box 62347, Addis Ababa, Ethiopia

Introduction

Ethiopia is a country of nearly one million square kilometers (km) extending between latitudes roughly 4° N and 15° N longitudes and roughly 33° E and 48° E.

An abundance of agricultural land is Ethiopia's main asset and it amounts to 62% of the total area of the country. From this area of land 62 million ha's of land can be cultivated as a rainfed and 12 million ha's by means of irrigation, But at present the cultivated land is only 7.2 million by rainfall and 350, 000 thousands of ha's by means of irrigation and this is feeding the 55 million people and expected to feed the increasing population.

Agriculture contributes over 46 percent of the GDP, accounts for 90 percent of the country's export earnings and employs 65 percent of the labour force.

The country has great agro-ecological diversity, ranging from below sea level to well over 3000 meters above sea level (masl), thus ranging from desert climate (<500 masl) to alpine climate (>3000 masl), on the bases of temperature and moisture regimes, the country can be divided into 18 agro-ecological zones and 62 subzones.

Agricultural Statistics

In Ethiopia many food and cash crops are grown by small peasant farmers, state and privately owned farms.

These includes cereals of which,

teff	1,253,400 ha's
Sorghum	782,600 ha's
Barley	1,056,700 ha's
Maize	1,095,600 ha's
Wheat	657,800 ha's
F.Millet	156,500 ha's

Legumes of which,

Faba bean	282,000	ha's
Field pea	108,400	ha's
Chick pea	135,600	ha's
Lentil	64,400	ha's
Harricot bean	82,500	ha's

Oil seeds of which,

Niger seed	115,500	ha's
Linseed	54,500	ha's
Sesame	1,200	ha's

others:

Vegetable crops, tree crops, Fiber crops etc,. 2,410,000 ha's

Pesticide Regulation, Policies and capabilities, Pesticide Regulatory Agencies

A Special Pesticide Decree (No. 20/1990) issued in September 1990, assigned overall 1 pesticide registration and control responsibilities to MOA's Pesticide Registration and Control (PRC) office. Under the MOA's present organizational structure, the PRC office, together with the Rodent, Weed, Pathology, Entomology, Grain Storage, Biological Control, Bird Control and Pesticide Chemistry teams, constitute MOA's Agricultural Development and Crop Protection Department.

Under the special decree:

a) all pesticides imported or manufactured in Ethiopia must be registered with the PRC office
b) registration is granted on the basis of demonstrated product effectiveness and safety for humans, nontarget organisms, and the environment
c) the importation of highly hazardous, severely restricted, or banned pesticides (including most organochlorines) is prohibited
d) all pesticides must have labels that meet specific MOA label requirements (content, form, color codes, etc.) The decree also seeks to promote safer pesticide handling and use (Annex 1)

In addition, an advisory committee has been established to advice the MOA on issues related to the decree's implementation. The advisory committee consists of seven specialists from the Ministry of Agriculture, the Institute of Agricultural Research, The Ministry of Health, the Ministry of Environmental Protection and

Development, the Ethiopian Authority for Standardization, and the Coffee Development Authority,

The PRC office focuses primarily on issues related to the registration of pesticides, although it is also directly involved in regulation of the sale, application, and storage of pesticides. At the regional level, at least 61 regional inspectors, who receive guidance and training from the central PRC team, implement this aspect of pesticide regulation.

Extensive media coverage has been given to the decrees issuance and the initiation of the pesticide registration process. This includes reporting on the risks associated with the use of the highly toxic pesticides.

Pesticide Registration and Import Requirements

Before issuing the special decree, Ethiopia did not register pesticides. Indeed, the pesticide registration process is just beginning. Applicants are required to submit basic information, as well as data on toxicology, effectiveness, residues, environmental effects, and labelling. Information requirements for registration and required information for labelling are found in Annex 2. The PRC Office and its advisory and sub-committees review data that have been submitted. The applicant for registration must also submit sample of the product for analysis. This material is tested in the analytical laboratory of the Ministry of Agriculture,

After the start of registration process, the PRC office gathers information on pesticide import pattern with the help of the customs office and the National Bank of Ethiopia and has created a registry of pesticides approved for use in Ethiopia. To date, application and supporting data have been submitted on 122 products, but registration is being processed for only 100 of these. The other 22 applications have been rejected. As of September 7, 1996, 45 pesticides are registered in the country and no pesticide is allowed to be imported or manufactured into the country if it is not registered as of July 7, 1996,

Pesticide importers are required to demonstrate that they have a valid license issued by the Ministry of Trade and Industry, appropriate storage facilities, knowledgeable personnel of pesticides and their management. Pesticide shipments are inspected for compliance with the special decree's requirements. There are 56 organizations registered for pesticide import in Ethiopia, about 28 of which are active.

Major agrochemical importers include state farms, the Ethiopian Seed Enterprise (ESE), the Malaria control program, Agricultural Equipment and Technical Service Enterprise (AETSE), and agrochemical companies such as BASF-Ethiopia, CIBA-GEIGY, AgrEvo, General Chemicals and Trading, Chemtex (Zeneca), Rhone-Poulenc .

All agricultural pesticides used in Ethiopia are presently imported. In the near future, however, the first pesticide formulation plant in Ethiopia will begin production of dust and liquid formulations of five insecticides. There is also one plant which produces one type of household pesticide.

The FAO's Prior Informed Consent Procedures

Ethiopia has participated in this Prior Informed Consent (PIC) arrangement since 1992 and has sent importing country response forms to the FAO concerning the 14 chemicals targeted by PIC thus far: aldrin, HCH (BCH), Chlordane, Cyhexatin, dieldrin, ethylene dibromide (EDB), fluoroacetamide, heptachlor, hexachlorobenzene, DDT, mercuric compounds, chlordimeform, 2,4,5-T and dinoseb.

The Pesticide Registration control office has also received notification from the European Union regarding pesticides restricted in European Union (EU) member states, in accordance with Regulation No. EU 2455-92.

Pesticide Supply

Official imports are now the sole source of supply for chemical pesticides. Illegal cross-border imports are not believed to be significant. The newly constructed formulation Plant at Adami Tulu, discussed earlier will significantly increase insecticide supplies. If its 3000 metric ton (mt) annual production capacity is realised, this will be twice the volume of recent insecticide imports.

From 1987/88 to 1993/94 the average level of pesticide imports for all uses, both agricultural and non-agricultural, was about 4700 mt (Annex 3, table 1) pesticide use in agriculture has been limited. Most use has been by state farms or other state organizations. Cotton grown on state farms has in the past accounted for a major share of pesticide use, particularly insecticides. Low usage in Ethiopia is in part from the relatively small share of exports in agricultural production, which contracts with the larger export share of other countries in the region such as Kenya, Tanzania and Uganda.

In a given year, significant deviations from average import levels occur, as shown in annex 3, table 1. Some of these fluctuations are cyclical and result from the need for domestic distributors to purchase every two to three years in order to keep stock on hand to meet expected demand. Organophosphates, which account for the largest share of pesticide imports, remain effective for several years under normal Ethiopian storage condition. When stocked in this manner they are readily available to combat new infestations.

Conclusions

Under the 1990 special decree, the MOA's PRC office has initiated a registration process for all pesticides imported and used in the country. The PRC office is also trying to enforce pesticide regulations at the retail level, in collaboration with regional inspectors, all aspects of pesticide management including safe handling, transport, storage, distribution, safe use and disposal.

Therefore, Ethiopia at its present level of chemical control can serve as an information center for any request from the network.

References

1. Ethiopian, statistical abstract, 1991

Annex 1.

(forms 'Application for Pesticide Registration')

Annex 2.

NEGARIT GAZETA of the People's Democratic Republic of Ethiopia
No. 21 / 1st September, 1990

containing Council of State Special Decree to Provide for the Registration and Control of Pesticides

Annex 3.

Total Pesticide Imports into Ethiopia (1000 lts or kg)

Year	Total Import	State Farm Use	Use by Others [1]
1987 - 88	5,618	1,738	3,880
1988 - 89	2,347	1,733	614
1989 - 90	9,370	1,222	8,148
1990 - 91	6,609	1,263	5,346
1991 - 92	473	790	- 317
1992 - 93	1,558	Na	Na
1993 - 94	4,062	289	3,574
Average (not including 1992-93)	4,746	1,172	3,574

Note: [1] One liter is roughly equivalent to one kilogram
This column is calculated as the excess of total imports over state farm use.

Source: Environmental and Economic Review of Crop Protection and Pesticide Use in Ethiopia.
Henry Gordon at al, November 1995

Country Paper

GHANA

THE PRODUCTION AND USE OF AGRO-CHEMICALS, THE PROBLEMS AND PROSPECTS AND ALSO FACILITIES AND ACTIONS TAKEN BY GOVERNMENT WITH REGARDS TO RISK REDUCTION IN AGRO-CHEMICALS DEVELOPMENT

(DR G.A. DIXON)

Ghana is predominantly an agricultural country. It's agriculture is on a smallholder basis, although there are large scale farms and plantations. Of the total 23,853,900 hectares land surface, 13,628,179 hectares constitute agricultural land area. About 4.3 million hectares of the agricultural land area is under permanent and arable crops.

The main system of farming is traditional, with the use of hoe and cutlass. However, there is mechanised farming in certain areas, and bullock farming is also practised mainly in the northern part of Ghana. Agricultural production varies with total rainfall distribution and with soil factors, showing strong regional diversity. Agriculture is vital to the overall economic growth and development of Ghana. It is the largest contributor to the Gross Domestic Product (DGP) accounting for about 52 %. It also accounts for about 60% of export earnings, and directly or indirectly supports 80% of the total population economically through farm labour etc. (MOFA - PPMED 1991).

Due to a warm, humid climate most of the year, a large number of insect-pest species and disease organisms attack crops. Pest and disease organisms are thus a major perennial threat to food security in Ghana.

Application of a variety of highly toxic pesticides is the single predominant pest control method in Ghana during pest outbreaks.

PESTICIDES PRODUCTION AND AVAILABILITY

All pesticides being used in Ghana are not manufactured in the country but are imported by private companies and others come under various grants (e.g. Japanese KR-2 Grant).

Furthermore, there are agricultural organisations in farming which import pesticides for their various agricultural activities. In view of the above, pesticides are available in the country throughout the year round.

FORMULATION OF PESTICIDES

As indicated previously no pesticide is manufactured in Ghana, however, there are 2 companies which formulate pesticides locally. The products being formulated include, insecticides (i.e. Unden, Gamalin and Aerosol).

PESTICIDE USE

Traditionally in Ghana, pesticides have been used primarily in the control of pests of export crops such as cocoa, coffee and cotton. Currently, however, pesticides use has assumed an increasingly significant role in the production of food crops and the prevention of vector borne diseases in Ghana in the last few decades.

The bulk of pesticides used in agriculture are insecticides, followed by herbicides and fungicides. The wide-spread use of pesticides is partly due to the advantage they offer. Pesticides work quickly making them suitable for use in emergency situations, and frequently they are the only remedy when crops are under immediate threat of lethal infestation.

Hitherto, there was virtually no official control in the importation, distribution, sale and use of pesticides in the country. Compounding this problem was the careless use of pesticides by individual appliers, who work with chemicals, thus exposing the entire human population and the natural environment to risk of pesticides poisoning and contamination.

Data on the health of workers, occupationally exposed to pesticides, is lacking, though it is apparent that large numbers of users are dangerously exposed on a routine basis. This situation prompted the setting up of a National Toxic Chemicals Committee (NTCC) in 1975 to advise Government of Ghana on measures to ensure good pesticide management and safety precautions in the country. Pesticide usage in Ghana continues to rise on an annual basis and the average yearly consumption is above 800 metric tons.

MAJOR TYPES OF PESTICIDES IN USE IN GHANA

The underlisted pesticides are the major kinds in use in Ghana.

(i) Insecticides
(ii) Fungicides
(iii) Herbicides
(iv) Rodenticides

There are other kinds inducing aboricides, acaricides, growth regulators etc.

PESTICIDES POISONING

In Ghana, there have been numerous pesticides poisoning incidents, many of them fatal. Some of the misuses of insecticides are for the tapping of palm wine, controlling hair lice, trapping wild life and for catching fish have resulted in fatal accidents. These incidents have necessitated the Ministry of Food and Agriculture to intensify its educational programme on safe and efficient use of pesticides.

Though pesticides are used nation-wide there are no poisoning centres in the communities where pesticide poisoning cases could be referred to, or for first aid treatment. Furthermore, our medical and para medical personnel lack basic training in handling pesticide poisonings.

DISPOSAL OF PESTICIDES

In Ghana, a common problem which pesticide users encounter following pest control operations is the disposal of pesticide containers. This disposal problem affects people and the environment, because there are no facilities available for destroying or for properly re-cycling containers. Consequently, most people use empty pesticide containers as drinking cups, water jars and carriers or as consumable oil and drinking alcohol containers.

PESTICIDE LAW

At long last, the pesticides Law of Ghana has been promulgated (Nov. 1996). This will go a long way to help regulate the importation, distribution, sale and use of pesticides in the country.

FACILITIES

FAO has since 1992 provided the country with a Quality Control Laboratory which is located in our National Nuclear Research Institute, Kwabenya. Personnel working in the laboratory were also trained by FAO however, the facility is not functioning, due to the breakdown of equipment. There is urgent need to restore the laboratory to its original state. Pesticide Residue Analysis Laboratory was also provided by FAO. This facility is being operated by the Ghana Standards Board and is functioning.

PUBLIC AWARENESS AND EDUCATION

The public is well aware of the hazards of misuse of pesticides. Recently there have been reported cases of deaths caused by misuse of pesticides.

These unfortunate fatal incidents were highly covered by the daily news papers and the national TV and radio with the intention of creating awareness in the public. Nevertheless, the Plant Protection and Regulatory Services Department of the Ministry of Food and Agriculture and NGO's have also been educating and training Subject Matter Specialists and Front Line Staff under the Unified Extension System and farmers on the safe and efficient use of pesticides throughout the country.

NEEDS

Now that Ghana has promulgated its pesticides law, there will be the need to solicit for both local and foreign funding to promote and improve existing pesticide management schemes, which include registration and control activities, capacity building and strengthening research and development in agriculture as a whole.

There is also the need to foster regional and sub-regional cooperation on pesticides management at institutional and network levels.

INTEGRATED PEST MANAGEMENT (IPM)

The Ministry of Food and Agriculture has also adopted the Integrated Pest Management (IPM) as its strategy for pest and disease control. This concept which hinges on participatory approach with it's Farmers Field Schools (farmer driven) training methodology is now playing a major role in agriculture production, especially in rice and cowpea production. Farmers are trained to use pesticide as a last resort and are made expert in their own fields through the training.

Ghana has the experience in this sustainable concept (FFS) and is prepared to share it's experience with other countries in this field especially in Rice and Cowpea production.

The IPM aims at:

- Minimum and safe use of pesticides.
- Maintaining ecological balances
- Minimizing environmental pollution due to pesticide use
- Minimizing cost of crop production and thus
- Maximizing profit for the farmers

CONCLUSION

With the enactment of the pesticides law other useful pesticide management programmes are anticipated. The goals of these programmes could he achieved and sustained through good planning direction, control, monitoring and evaluation activities.

Country Paper

KENYA

RISK REDUCTION IN THE DEVELOPMENT OF AGROCHEMICALS IN THE AFRO-ARAB REGION

MEETING IN MAURITIUS, DECEMBER 4th - 6th, 1996

presented by Judith Mutea

Ministry of Agriculture Livestock Development & Marketing

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NAIROBI

ABSTRACT

Kenya is one of the three East African countries with a population of 29.3 m people.

Agriculture is the mainstay of the economy with 78-80 % of the active population being involved in farming activities. The contribution of agriculture to GDP is 29.1%. Agriculture output is more dependent upon weather fluctuations although there is a marked increase on irrigated land in Mwea Tabere and along Tana and Athi rivers. Major field crops are maize, beans, tea, coffee and horticultural crops.

Fertilizer consumption is 285,000 tons per year valued at 57 M US dollars whereas pesticide consumption is estimated at 45M US dollars.

Pyrethrum is produced in the country at an average yield of 11,000 tons per year most of which is exported.

The Pest Control Product Board of the MOALD&M regulates pesticides trade in the country. Kenya Agricultural Research Institute co-ordinates research on pest identification and control, pesticide residue analysis and integrated pest management.

Similar programmes are being carried out by the I.C.P.E. Kenya Safe Use Project in collaboration with the Plant Protection Services Branch of the Ministry of Agriculture has trained 2,500 extension staff and 300,000 small scale farmers on safe and effective use of agrochemicals. The country has adequate facilities and trained personnel to enable full participation in the Afro-Arab Network.

INTRODUCTION

Agriculture, the mainstay of Kenyan economy, accounts for about 29.1 % of the Gross Domestic Product, 60% of export earnings and absorbs over 70% of the labour force.

Large scale farms exist, especially for dairy cows and plantation crops such as coffee, tea and flowers. However, with increased population pressure the trend has been to subdivide farms into smaller units. The result of which is a mosaic of small farms often less than one hectare, on which each farmer tries to accommodate a whole range of crops and livestock.

Small holder farms constitute about 80 % of the farming community in Kenya. Main crops include maize, sorghum, millet, various types of beans, Irish and sweet potatoes, bananas and cut flowers.

To feed a growing population estimated to be 35 million Kenyans by the year 2,000 and have surplus for export, national strategies have been adopted basically aimed at intensifying the production yields per unit of land in various ways. One key method is protecting crops from pests and diseases. Protecting crops from various losses will cost the farmer pesticides, water, labour and time. This paper reviews various advances the country has made towards better utilization of farm inputs, pesticides included, in order to reduce risks, both at National and farm level.

AGROCHEMICAL STATUS IN KENYA

Major pests of economic importance to the country include, African armyworms diamond backmoth, thrips, spidermites, maize stalk borer, maize streak virus, striga and antestiabugs.

Pesticides used are mainly Pyrethroids, Organophosphates, and little of Carbamates.

Recorded data on pesticide imports is always available and well maintained at the Pest Control Products Board.

The major agrochemical companies in Kenya are:

- ICI (Twiga)
- Rhone Poulenc
- Bayer
- Ciba
- AgrEvo

The country is a producer of pyrethrum with an average output of 11,000 tons of dry flowers per year.

The Agro-chemical trade is properly managed through the existing pesticide registration scheme, administered by PCPB and therefore every product registered for use in the country is safe to use provided that it is used strictly according to the label instructions on every pesticide package, taking into account the crops for which it has been registered, the indications for which it has been recommended and the preharvest interval specified.

Unacceptable residues can remain in food if too little time is allowed between the last pesticide application and harvesting.

The country is concerned about the health and safety of farmers who produce for both local and foreign markets making sure that the operations of pesticide application not damage the environment.

The MOALD&M through the extension officers together with Safe Use Project continue to train growers on how to use pesticides responsibly and safely ensuring that appropriate pesticide application techniques are applied.

TABLE I: PESTICIDE CONSUMPTION IN THE COUNTRY (BASED ON IMPORT FIGURES)

MILLION KSHS; (1986-1995)

YEAR	INSECTICIDES ACARICIDES	HERBICIDES	FUNGICIDES	OTHERS	TOTAL
1995	707.0	312.1	682.6	74.4	1776.4
1994	479.3	286.5	432.8	84.5	1283.1
1993	428.7	272.2	441.8	64.1	1206.8
1992	505.0	228.5	457.1	101.7	1292.3
1991	202.0	146.8	223.8	41.8	614.6
1990	260.3	159.4	169.2	55.6	644.5
1989	208.1	154.2	328.8	30.7	721.8
1988	158.9	145.2	329.9	28.5	662.5
1987	182.3	173.4	357.3	28.1	741.1
1986	134.9	121.3	281.3	42.6	580.1

TABLE II: QUANTITY IN TONNES 1986 -1995

YEAR	INSECTICIDE ACARICIDE	HERBICIDES	FUNGICIDES	OTHERS	TOTAL
1995	1413.3	870.6	2323.0	501.9	5108.8
1994	1049.9	747.4	1671.8	563.3	4032.4
1993	839	882.0	1503	309	3533.0
1992	1670	1122	2634	1164	6590
1991	1072	844	1568	570	4054
1990	1572	1134	1330	857	4893
1989	1571	1148	4327	665	7711
1988	1089	2108	4259	801	8257
1987	1206	1311	715	697	10371
1986	1076	112	654	808	9597

PESTICIDE LEGISLATION

Agrochemicals are widely accepted and used by both large and small scale farmers. Use of agrochemicals has greatly contributed to the success of growing quality coffee and horticultural crops for local consumption and export as well as for the general control of pests in food and industrial crops.

PEST CONTROL PRODUCTS BOARD (PCPB)

The board is an important arm of the Government of Kenya that is charged with responsibilities of all pesticide registration in Kenya.

Kenya established pesticide legislation in 1982 and the Board (PCPB) formed immediately to enforce the law on pesticides.

The law covers import, export, inspection, analysis, safe use and environmental toxicology of pesticides. For a product to receive full registration can take as long as 3-5 years.

The board inspects and licenses pesticide premises at whole sale and stockist retail level and also manufacture and formulation plants.

The board comprising of 13 members meet annually and advice the Minister for Agriculture on all matters relating to the enforcement of the provisions of the act and any regulations made.

Any person who hinders or obstructs an inspector of the board acting in exercise of his powers and the section of the act is guilty of an offence and would be prosecuted.

CURRENT RULES ON IMPORTATION OF PEST CONTROL PRODUCTS

There exists two schedules in the pesticide act under which agrochemicals may be imported into the country. Pest control products importation is strictly controlled through registration under the pest control products act which is under review from time to time to avoid misuse of information or importation of dangerous unregistered products.

The government requirement is that all pest control products be imported through PCPB to ensure proper regulation under the act and to avoid dumping of hazardous agrochemicals into the country.

INSPECTION OF IMPORTS OF PEST CONTROL PRODUCTS BY KENYA BUREAU OF STANDARDS (KBS)

There exists a legal notice No. 227 on quality inspection of imports (quality of imports order 1995) by the Kenya Bureau of Standards effected in 1995.

The legal notice includes agrochemical as items for inspection at the ports of entry and are subject to an import inspection levy of 0.2%.

DISPOSAL OF UNWANTED PEST CONTROL PRODUCTS

The Government of Kenya through the customs department auctions seized and uncollected pest control products, some of which could be smuggled into the country, adulterated or expired for use and some cases banned for use in the country. These products are however recommended for safe disposal by PCPB to avoid unscrupulous dealers legitimising the products.

The AAK together with the MOALD&M and Safe Use Project have initiated a disposal project of unwanted pest control products throughout the country.

Presently the country does not have proper disposal facilities including gazatted dumping sites and incinerators but the GOK considers seriously proper agrochemicals waste disposal in order to reduce the risk of environmental pollution.

The pest control products board is in the process of drawing up guidelines on disposal of pesticide wastes in Kenya. Through various discussion panels, technologies available are explored to find out one that would be most effective and least disruptive to the environment. One of the technologies being considered is the use of cement kilns for disposal of hazardous wastes. Kenya Institute of Waste Management is well in a position to give technical advice.

UNWANTED PESTICIDE STOCKS - KENYA (1993/94)

Type	Insecticide	Fungicide	Herbicide	Other	Total
Dusts	15,680	---	---	---	15,680
WP's	2,907	2440	3275	1120	9,742
Liquids	57,500	2,000	14,000	4000	77,500
Granules	1003	---	---	---	1003
TOTAL	77,090	4,440	17,275	5,120	103,925

Source: Plant Protection Services Branch Survey 1992/93

LIST OF BANNED/RESTRICTED PESTICIDES IN KENYA

1. Dibromochloropropane	-	soil fumigant
2. Ethylene dibromide	-	soil fumigant
3. 2,4,5-T	-	herbicide
4. Chlordimeform	-	insecticide
5. Hexachlorocyclohexane		
6. Lindane	-	insecticide
7. Chlordane	-	insecticide
8. Endrine	-	insecticide
9. Heptachlor	-	insecticide
10. Aldrin	-	insecticides restricted for termite control in building industry
11. Dieldrin		
12. DDT	-	restricted to Public Health, only for control in mosquito breeding grounds but for agricultural use
13. Toxaphene (Camphechlor)	-	insecticide
14. Daminozide (Alar)	-	plant growth regulator; voluntarily withdrawn by the company
15. Cyhexatin (plictran)	-	acaricide; withdrawn
16. Parathion methyl	-	insecticide
17. Parathion ethyl	-	insecticide

1. METHYL BROMIDE PLACE IN KENYA's AGRICULTURE

- up to 20 % food loss is due to pre- and post harvest pests
- about 500 pesticides are imported annually, at a cost of K£ 32-42 million
- methyl bromide makes about 20% in total value
- it has been in use since 1960s, mainly in

  * soil fumigation: 35 % of imported methyl bromide
  * stored grain: 40% of imported methyl bromide
  * import/export (perishables): 25%

- soil fumigation takes up 70% of methyl bromide used in high value crops, e.g. Yoder (K) Limited
- Post harvest fumigation with methyl bromide helps to avert serious storage losses.
- Import/Export fumigation is facilitated by the quick action of methyl bromide
- No doubt, many would like to retain it, but all these are sources of emissions to the atmosphere

2. METHYL BROMIDE EMISSIONS AND THEIR IMPACT ON THE ENVIRONMENT

- Ozone equilibrium exists under natural conditions
- Methyl bromide from man's activities disturbs this equilibrium
- Up to 60% of the applied methyl bromide is emitted to the atmosphere from various treatments, depending on:

  - degree of containment
  - temperatures
  - moisture content
  - reactivity of the treated material, and
  - mode of application (soil treatment)

- Bromine and chlorine atoms react with the ozone
- Methyl bromide contributes 25% of the bromine in the air
- Bromine potential as an ODS = 50 x that of chlorine atom
- Ozone in the atmosphere filters the UV-b light from the sun
- Its reduction is linked to global warming, ozone hole, health hazards: eye, skin, and immunity disorders.

3. ALTERNATIVES

- Intended phase out will affect Kenya's agriculture, especially high value horticultural produce
- Kenya cannot afford to be an island for methyl bromide uses
- No alternatives exist for all methyl bromide uses, but options are available for:

  * high value crop production: soil steaming, use of other nematicides (Dazomet, Telone II, etc.)
  * stored grain: CO2 and Phosphine gas
  * improved use of methyl bromide to reduce emissions
  * research on new and more environmentally friendly pesticides: botanicals, e.g. pyrethrum, neem
  * organic farming package

- A change of attitude is called for: to accept slightly damaged produce as good produce, otherwise the continued reliance on pesticides will not make our world a better place for the future

Country Paper

KUWAIT

Risk Reduction of Pesticides in Kuwait

by
Yosseuf Al-Tarakma Director of Pest Control & Qu. Division

Abstract

Kuwait imports 25.30 MT of Pesticides annually for use in agriculture of which 60% are insecticides, 25 % fungicides and the rest others.

There is a pesticide regulation procedure in the country which has to be observed by all dealing in pesticides.

Kuwait has banned 62 pesticides a list of which is enclosed.

Quality control procedures are followed and chemical, physico-chemical and biological tests are carried out before permitting the import of pesticides.

In order to reduce the load of chemicals on the environment bio-pesticides are being increasingly applied and pesticide application sequence adjusted to minimise building of resistance of resurgance of pests.

The IPM programme is being implemented and the use of bio-pesticides botanical pesticides and predators and parasites are being promoted.

1. Pesticides' Consumption in Kuwait:

Kuwait annually imports approximately 25 - 30 tons of agriculture chemicals to be used in agriculture sectors. These chemicals can be categorised into:

- 55 - 60 % insecticides
- 25 - 30 % fungicides
- 10 - 20 % for other pests.

2. Pesticide registration requirements:

1- Registration any chemical, the applicant must have been represented by Kuwaiti agent

2- A regulatory notice under the authority of the pesticide committee issued to a foreign applicant will be deemed to have been received by the foreign applicant once it has been received by the Kuwaiti agent

3- The name and address of Kuwaiti agent must be on the application form.

4- The registration of a pesticide may be suspended or cancelled if the product is found to present an unacceptable risk or harm to crops or domestic animals

5- The registrant will be given every opportunity to document the effectiveness and safety of the product.

The following list represent pesticides that suspended or cancelled in state of Kuwait.

Pesticides suspended or cancelled in Kuwait

1-ALDRIN	2- ALUMINUM PHOSPHIDE
3- ALDICARB	4- BINAPACRYL
5- B.H.C.	6- CHLOROBENZILATE
7-CHLORDANE	8- CYHEXATIN
9-CAPTAFOL	10- CAPTAN
11-CHLORDIMEFORM	12- CARBOPHENOTHION
13- CARBFU RAN	14- CHLODECON
15- D. D.T.	16- 2.4.D.
17- DIELDRIN	18- D.B.C.P.
19- DEMETON	20- DINOSEB
21- DIQUAT	22- D.D.V.P.

23- DICOFOL	24- ENDRIN
25-ENDOSULPHAN	26- E.D.B.
27- FLOUROACETAMIDE	28-FORMALDEHYDE
29- HEDTACHLOR	30- H.C.H.
31- HEXACHLOROBENZENE	32- KEPTONE
33- LINDANE	34- LEAD AND LEAD COMPOUNDS
35- LEPTOPHOS	36- MERCURY COMPOUNDS
37-METALDEHYDE	38- MIREX
39- MESURAL	40- MONOCROTOPHOS
41- METHYL BROMIDE	42-METHAMEDOPHOS
43- METHOMYL	44- METHOXY CHLOR
45- PARATHION	46-P.C.B.S.
47- PHORATE	48- PARAQUAT
49- PLICTRAN	50- P.C.T.
51- P.B.B.	52- PHOSPHAMIDON
53- PENTA CHLORO PHENOL	54- SULFOTEPP
55- SCHRADAN	56- TOXAPHENE
57- TRICHLOFON	58- TRITHION
59- THALLIUM SULPHATE	60- TEPP
61- TELDORIN	62- ZINC PHOSPHIDE

3. Quality control tests are:

- chemical analysis
- physico-chemical properties, and
- biological effectiveness carried out before declaration of the imported pesticides to checkout their effectiveness and minimize side effects.

4. Bio-pesticide Development:

We have started preliminary studies to isolate, identify, bioassay and formulate a local bacillus thuringensis strain(s). Preliminary studies prove that the local strain could be successfully used for controlling some pests under tropical climate such as in Kuwait and other gulf countries.

Formulating local B.t. strains using some local ingredients such as diluents, carriers and other additives, still under investigations.

Efforts to reduce the load of pesticide in the environment:

Some efforts are being directed to minimize the pesticide usage for example:

A-Wise-use of pesticides:

1- Pesticide sequence:

To minimize pesticides consumption in state of Kuwait our pest control programmes include different chemical groups, so resistance or resurgance of pests could be delayed.

2-Winter spraying with natural pesticides:

Natural (mineral) pesticides such as sulfur and petroleum oil are used during winter to control dormant pest stages on some fruit trees mainly date palm. The result could be summarized in the following table:

Table: suitability of mineral oil and sulfur as winter spraying for controlling Date palm pests

Treatment #	Conventional treatment	Oriented treatment
1	Diazinon	---
2	---	Petroleum oil
3	Fentrothion	---
4	---	Micronized sulfur
5	Delein	---
6	Carbendazim	---
7	Crotophos	---
8	Malathion	---
9	---	Amitraz
10	Dicofol	---
11	Nissron	Nissron

yield (kg/tree)		
samran	92.2	97.2
berhy	139.2	138

Data clearly show that while pest control costs could be reduced down to 42%, the date production increased up to 17% as a result of the pesticides wise use.

B- Use of bio-pesticide:

Our integrated pest control (IPC) program for controlling pests in Kuwait is directed to include some bio pesticides as a components of biological control.

Mycostop (bio-fungicides), thuricide (bio-insecticides), mycotol (bio-insecticides) and vertemic (bio-insecticide) are bioassayed and then locally used for controlling soil fungus, caterpillars, whiteflies, aphids and mites respectively.

C- Botanical insecticides:

Some botanical insecticides are used in pesticides sequences to minimize synthetic pesticides usage and to delay the emergence of resistent strains. Among those are: Deutur (a liquid wax extracted from jojoba seeds), Azidrachtin (an oil liquid extracted from neem trees) and savona (hydrolyzed vegetable oils).

D- Predators and parasites:

Introduction of predators and parasites for controlling some insect pests mainly suckling pests (aphids, whiteflies and thrips and mites in greenhouses still in 1st steps).

E- Agrotechnical measures:

Nets and sticky traps are successfully used in controlling adult stages of some sucking pests in greenhouses and as a monitor for using other synthetic pesticides.

Country paper

LEBANON

PRODUCTION AND USE OF AGROCHEMICALS PROBLEMS AND PROSPECTS

PAUL MASRI
Ministry of Industry - LEBANON

ABSTRACT

INTRODUCTION:

The cultivated land in Lebanon is around 332.3 thousand hectares, representing about 32% of the total area of Lebanon accounting for 10400 Km^2.

Permanent crops account for 90 thousand hectares, seasonal crops counting on rain 148.9 thousand hectares and 93.4 thousand hectares on permanent irrigation. The surface area covered by forests is about 80 thousand hectares (80000) and land pasture 10 thousand hectares. Total agricultural output is about 9 % of the total national output.

The labor force in Lebanon is about 1.1 million, and 75 thousand work in various fields of agriculture. The total number of rural population is about 9% of the total population of Lebanon.

There are about 1647 thousand towns in Lebanon. 406 in the north, 608 in the mount Lebanon, 412 in the south and 221 in the Bekaa valley.

The annual rainfall season in Lebanon begins from November till February, with small amount during the remaining months.

The proportion of people working in the agricultural sector in 1965 was 29% from the whole labor force. This proportion dropped during the years 1990-1992 to 14%. This proportion for the industrial sector was in 1965 24%, it increased to 27% for the same period 1990-1992.

Past situation of the fertilizer and agrochemical industry:

The fertilizer industry started its activity in 1966 when the Esso factory started producing fertilizers working out at an output of 30000 tons of ammonium sulfate (21%N) and 22300 tons of ammonium nitrate (26%N) and 83000 tons of compound fertilizers (N,P,K). The required ammonium for this industry was being imported from Greece and Italy. In 1975 when the troubles started in Lebanon the company was producing only ammonium sulfate till 1977 noting that it was importing ammonia and anhydrous ammonia from abroad. But afterwards this company closed definitively.

Lebanon possessed also a modern plant for fertilizer manufacturing located in Selaata, the north of Lebanon. During the troubles of 1975 this plant closed due to many problems:

a) inflation
b) increases in salaries
c) no market for the production: high storage

If we have a general look to what Lebanon has consumed during 1979/80 of nitrogen fertilizers we see that it ranges around 30 thousand tons of ammonium sulfate (21%N) and 20 thousands tons of ammonium nitrate (26%N) and around 40 thousand tons of compound fertilizers (N, P, K 25%).

The weed and insecticide industries is a complementary one, most of the insecticides retire their raw materials from the crude oil and through the insertion of certain materials as chlorine.

Table showing the evolution of use of cultivated lands in Lebanon from 1977 till 1992.

Thousand hectares*1 000	1977	1982	1987	1992
Cultivated land	325	298	298	306
Temporary crops	228	210	208	216
Permanent crops	97	88	90	90
Forest land	90	85	80	80
Irrigated crops	86	86	86	86
Land pasture	10	10	10	10

Source from Bank Audi - Lebanon: Landuse (in hectare)

Agriculture (arable land)	207060
O.W. irrigated	60047
Grazing	360000
Forest and woodland	79560
Other land	97000
Total	1045200

Table showing the evolution of the working force in agriculture.

*1000	1980	1985	1990	1991	1992	1993
people depending on agriculture	382	301	240	231	223	216
people working in agriculture	106	87	75	73	71	69
proportion (%)	14.3	11.3	8.8	8.3	7.9	7.4

Rainfall in (mm per year)	893
Number of rainy/year	78
Humidity rate	68 %
Human development index UNOP	0.60

Macroeconomic indicators	1993	1994	1995
GDP (OSS million	7600	9500	11700
Real GDP growth rate	7%	8.5%	7%
GDP deflator	19%	16.5%	16%
GDP per capita	2000	2450	3000

The present situation of fertilizer industry and agrochemicals:

The most important companies producing fertilizers today in Lebanon are:

a) the Selaata chemicals company located in the north.
b) the Unifert Adonis company located in Nahr Ibrahim outside Beirut.

The Adonis unifert company is a formulator for fertilizer and not a producer. It imports raw material from Europe (France: Rhône-Poulenc), England, and Belgium as potassium nitrate, ammonium phosphate, ammonium nitrate, urea, magnesium sulfate and the oligo-elements. This company prepares fertilizer formulations to which it adds the trace elements and required quantities needed by the plant. These are being used by plant through drip irrigation or foliar application and not by soil application as to the traditional fertilizers. This is a new trend in fertilizer formulation followed by the company regarding the use of complex N, P, K, fertilizers making them 100% soluble.

The consumption of soluble fertilizers in Lebanon is about 1000 tons/year mostly exported to Saudi Arabia, Jordan, Syria and Egypt. 400 tons are used locally and 600 tons are being exported.

The company also produces herbicides at a rate of 60 tons/year, insecticides at a rate of 400 tons/year both contact and systematic insecticides, fungicides mainly sulfur at a rate of 700-800 tons/year. The technique used is importing raw material and mixing at the proper proportion required of active ingredients.

The responsible told me that through the production of 100% soluble complex fertilizer, probably there is no waste, otherwise the company will lose. There is no energy expenditure for cooling-heating processes.

Moreover, as far as IPM (Integrated Pest Management) is concerned the company has commercialized two new products as biopesticides and has set a research program on integrated pest control.

The major problems faced by the company as the responsible pointed out are:

i) Raw material mostly imported from European countries. Their costs and that of the auxiliary agents had risen worldwide due to the increase of petroleum products and inflation in European countries.

ii) Lack of long term credits at low rate of interest for industry.

iii) Some traditional problems linked with the infrastructure. But this situation is progressing due to the various projects the government has undertaken and the companies themselves sometimes solve their own problems .

iv) Another major problem faced by the company is related to the expenditures associated with importing and exporting as tax duties. As such their products can not be anymore competitive.

There should be some official actions in order to reduce this extra expenditures on imports and exports. The company must pay the required amount settled by the law.

As far as phosphoric acid is concerned the production capacity for Lebanon reached 100.000 tons, and for monophosphate 120.000 tons and triple superphosphate 300.000 tons. Lebanon Chemicals Company located in Selaata, the north of Lebanon, manufactures phosphate fertilizers.

There is also a plant located in Beirut preparing fertilizers by mixing only. It is not a manufacturer. All raw materials are imported from abroad. Most of its production is exported to Syria. It makes different kinds of fertilizers suited to every plant. The company prepare also complex fertilizer (N, P, K) 15, 15, 15. Raw material are imported in powder or granules. There is not so far a pollution from this process and their engineers play an advisory role when they visit farmers. Every engineer is assigned a specific area and makes sure the farmer is using the correct amount of fertilizer needed by the plant to avoid luxurious use and be harmful to the plant, and the farmer by increasing its costs.

They established also a center called the Lebanese center for studies and research in agriculture where they carry annual studies for agriculture development and they publish an annual report annually.

The government can play some role to reduce as much as possible some of the problems encountered by these plants through official research centers, and setting up to date norms related to the fertilizer production and pesticide production by LIBNOR (Lebanese Normalizing Institute).

Moreover, government ministries or agencies should cooperate together with agricultural universities to carry research program needed by industrials to use modern technologies in fertilizer production and agro related chemicals through the best application of IPM, and thus reducing as much as possible pollution to the air, soil and water and risks encountered by farmers through the abusive use of agro related chemicals. By developing bio pesticides, a more healthy agriculture will be established.

The government published data related to the exports and imports of fertilizers. I have been able to collect some, related to the respective years of 92, 93, 95 and 96 till April.

For 1992, 110 tons were exported and 17996 were imported.
For 1993, 16149 tons were exported and 44192 were imported.
For 1995, 9009 tons were exported and 22156 were imported.

Research programs carried by Government or universities

As far as research and cooperation programs are concerned, it seems they are weak. But, the faculty of agricultural sciences of the Lebanese university is member of a committee grouping it with the faculty of medical sciences, to solve problems related to the pollution of the environment.

The faculty of agricultural sciences of the American University of Beirut, through the Department of Crop Protection has a research program linked to the field of IPM (Integrated Pest Management). It is carried out by Dr. El Fakhr and is about a botanic pesticide. It is a plant extract that seems to have the power to manipulate the behavior of some insects as the aphids, the leaf minor and white flies. This plant discovered in Lebanon has shown to have through its extract an effect similar to the one found in a plant called "Neem": Indica proper to the ocean indian. Now, more trials and researches are being carried out.

The next step will be focused on the application side directly in the field. But as far as IPM (Integrated pest management) this new technology is still at its beginnings in the universities and in local plants to create new environmentally safe pesticides.

Important topic or topics for the country

At first look, most of the topics are important and interesting for Lebanon, but it seems that bio/botanical pesticide development will solve many problems reducing the adverse effects of pesticides on the environment, and some of the accidents encountered by the farmers using traditional pesticides.

Moreover as it has been pointed before the school of agriculture of the American University of Beirut through the Department of Crop Protection is carrying research on bio/botanical pesticide development and results are being promising. The explanations have been developed earlier in this report.

Another important topic is the information collection and dissemination covering pesticide production, data on accumulation of pesticides, data on industrial waste, toxicity data, ... But this topic needs the building of an infrastructure.

Another important topic is the formulation technology topic. This is important because the research institute of the ministry of agriculture is well adapted to this topic. The director of the institute told me that they are carrying tests on pesticides formulation. The laboratory is well equipped for pesticide analysis. Tests are being made on their formulation and residual effect in food. When the laboratory receives the samples it carries out the necessary tests, but not on his personal request. The tests are carried out for pesticides being imported and may be locally produced to be sure that their composition is conformed to the right chemical formula and for the relative percentages of the active ingredients. Sometimes, pesticides residues are being found in food. But the director told me frankly that till now there is no rigorous control for all pesticides being imported. He added that since 4 years they are working on a project with the cooperation of FAO on the biodegradation of pesticides.

Another institute but private is the crop protection department of the school of agriculture of the American University of Beirut carrying research on bio/botanical pesticide development, with its equipment and laboratory.

The other topics related to industrial hygiene, occupational health and safety, waste management, IPM concepts, quality control are also important .

CONCLUSION

In conclusion, fertilizer and pesticide production still cause pollution to the environment, and have harmful effects on human health. Much has to be done by official responsibles and plant owners to equip their firm with material that reduce pollution. By keeping a good maintenance for the equipment, much is saved and pollution is reduced. But in order for the job to be done perfectly Lebanese norms have to be up to date. We still refer to old norms. LIBNOR (Lebanese Normalizing Institute) has to prepare these up to dated norms related to fertilizer and pesticide production and rigorous reglementation should be applied for all agro related products entering the country. Farmers should never use agro related products that are recognized by the WHO as harmful, and concerned ministries and local companies should advise farmers, how to use fertilizers and pesticides, and at what proportions, because many accidents occur as a result of misunderstanding or misuse.

Even if much is done in the field of bio-botanical pesticides production, and this will be the future trend, chemical pesticides are still essential and it is only through an IPM (Integrated Pest Management) control and program that the use of biological, chemical pesticides, and cultural practices that can be harmonized. Cooperation between official research centers and agricultural universities should be intensified through donations to carry on research program on cleaner production technologies and bio botanical pesticides formulations. Lebanon has to be linked to regional and international centers specialized in the dissemination of data, information and technologies related to fertilizer and pesticides or agro related products.

Country Paper

MADAGASCAR

PROBLEMS AND PRIORITIES IN THE MANAGEMENT OF CHEMICAL PRODUCTS IN MADAGASCAR

by
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INTRODUCTION

Located east off the coast of Africa, Madagascar is a 587.000 km² Indian Ocean Island, with about 13 millions inhabitants.

A sustainable and harmonious balance between the human development needs and ecological concerns is the national environmental policy target. In that perspective, the country strains to control the socio-economic development taking into account the natural resource conservation , to limit the negative interactions and consequences that will impact the human being and the environment.

Madagascar is already a member of certain international conventions related to the protection of environment such as the Vienna and Montreal Conventions. The adhesion to the Bamako's convention is being in process.

Currently, the country proceeds to the free market law in order to attract new investments needed for the development of industrial sector. The progress of industrial and agrochemical pollution due to the production process, the transportation, the storage and the handling of toxic pollutants parallels the intensification of the production.

However, the pollution in Madagascar is non significant and very located, its control has to take place in preventive manner, so through legal procedures on the Civil code, Public Health, Hygiene and job safety, Conservation and protection of the environment. It is

noticed that the country takes responsibility concerning the human intoxication and environmental contamination,

STATUS OF ACTIONS

As of today the world is equally concerned about non pound pollution sources and localised pollution sources, Madagascar focuses its actions in those two types of pollution.

The country is mainly an agriculturally oriented producer, with a 34.5% contribution to the GDP . It is also noticed that agricultural sector is the main user of chemical products (according to the survey made by the VOARISOA project the estimated average use of pesticides amounts 1200 T/year).

The industrial sector, which is just a user of chemical products as input for the production process, with 11.7% contribution to the GDP (1994), causes localised but non significant pollution.

These last years, population and decision-makers have given more attention to environmental problems and among these are the risk of chemical products handling. Consequently, the management of chemical products should be included into any prospects of environmental protection and conservation.

For the field of pesticides, Madagascar evolves progressively to a more rigorous management of the commercialisation, distribution and uses of the agro-chemical products , by implementing legal and regulatory charts, by setting up a structure of control inside the national department of phytoprotection (systematic control at all levels, mandated sampling for the import and for any two years and older stored chemical products) and by creating a national committee for registration. Those controls are reinforced and completed by educational programmes for sales persons and distributors of these products and by information and sensibilisation of potential users, more specifically the agriculturists.

For the industrial and consumption chemical products, the establishment of the legal and regulatory chart is just at it's beginning. However, a permanent structure in charge of environmental management is already created inside the Ministry of Industry. This structure targets to be an information source for the industrial sector, to collect and spread information susceptible to impact the environmentally sensitive development.

Actions are taken to promote a mechanism of coordination of all concerned entities related to chemical use safety. Consequently, it was decided to prepare the national profile for the evaluation of the national capacity for the management of chemical products.

One sectorial program of the ecologically sustainable industrial development was initiated with UNIDO. It has as objective the establishment of a support system for the best integration of the environmental concerns inside the industrial development policy and the industrial enterprise management. On the other hand, diverse non governmental organizations contribute to prevent and to lessen the risk relative to the uses of toxic products (e.g. VOARISOA project which works for research and development, data collection and education activities).

PROBLEMS

Priority problems tied with importations, uses and destruction of chemical products are due principally to the lack of legal and regulatory charts related to the chemical products (indeed the industrial and consumption chemical products), the deficiency of a control structure and the inadequacy of the infrastructure. Actually, we are faced to a problem of out of date stored pesticides.

MEASURES TO BE ADOPTED

The judicial means for the management of chemical products can be improved by the elaboration of national policy and the establishment of required legal chart. Data collections, updatings and analysis can be improved by the creation of databanks for all fields and by regrouping all informations at one center for a data management, furthermore by implementing the network with permanent structure . The feeling of chemical security at the national level would be greatly improved if information about the potential risk of chemical product are massively diffused.

The adhesion to International Conventions, the respects of adopted engagements and the adoption of required chart at a national level for the reinforcement of needed actions constitute different alternatives for the application of judicial tools. This requires the awareness of all decision making levels.

CONCLUSION

So is the prevailing situation in Madagascar relative to the management of chemical products. For us to access to a valuable policy in term of chemical management, technical assistance are needed such as a support for a rational and efficient data management, education of qualified technicians, free and facilitated access to information sources, reinforcement of national abilities to control, research and analyse the environmental impact, to formulate and develop new initiative measures.

ANNEX

National territory coverage:	(10^3 ha)	%
arable lands	5,000	8.4
denuded lands	42,000	71.4
wood and forests	7,000	11.8
vineyard and orchard	1,000	1.6
non cultivated agricultural area	1,000	1.6
non agricultural area	3,000	5
Totals	59,000	100

Occupation of arable lands	%
cereals	28
industrial cultures	3
tubercule and roots	9
leguminous	2
oleagineous	1.2
exportation commodities	6.4
others	0.4
still non-used	50.2

Sectorial Gross Domestic Products rate (1%)

- primary sector : 34.5
- secondary sector : 11.7
- tertiary sector : 53.8

Annual average of import chemical products:

(imported from 1991 to 1994, according to their degree of toxicity)

degree of toxicity	annual average (kg)	%
very toxic	132,612.25	2
toxic	1,150,303.75	16
irritating	2,928,900.50	41
harmful	1,268,941.75	18
others	15,948.38	23
Total	7,075,603.25	100

Out of date stored pesticides:

(inventoried by provincial services of phyto protection) = 66.171 kg or litres

Country Report

MALAWI

RISK REDUCTION IN THE DEVELOPMENT OF AGROCHEMICALS

the
MALAWI CONTRIBUTION

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(A paper submitted at the Afro-Arab Network meeting in Mauritius, 4 th -6 th Dec., 1996)

Summary

Malawi's economy is agrobased, hence a lot of pesticides are used to reduce yield losses due to pests and diseases. With the ever increasing population , there is need to increase agricultural production. When the currency is devalued to offset a deficit in balance of payments by the government, more exports have to be made by the country and this entails an increase in production. Such an increase in production can come about by either increasing the hectarage or increased production per unit area.

Malawi does not manufacture pesticides at all. It solely depends on importation and is therefore at the mercy of the manufacturer. Most of the pesticides come to Malawi as donations and such donations may come as close to the expiry date or as dumping offs.

Previously pesticides were under the fertiliser farm feeds and remedies act, but in 1996 the pesticide segment was removed and some laws were repealed to conform to the liberalisation policy of the government. The ministry appointed a pesticide registrar whose job was to register pesticides that came into the country and to check the claimed validity of the many chemicals which chemical companies claim to be working. There is no pesticide monitoring scheme in the country at present.

Preface

For one to start a pesticide shop in Malawi, one needs to get a trading license from the Ministry of commerce and industry , then get a district or a city license to trade. There is no need to consult the MOH, MoALD and MOREA . These ministries are only consulted when a problem arises. With this liberalisation, there is no law which prevents anyone in Malawi to trade in pesticides. There are no restriction as to where these pesticides can be sold. One can find pesticides along the roadside, in shops next to food stuffs.

No instructions are given to any seller on the safe handling of pesticides and this has led to poor storage and food poisoning . The rate at which food poisoning has gone up based on reported cases is alarming, while non reported cases go unrecorded. The main contributing factor to the low reports in terms of poisoning is that a report on poisoning is a police case and the police takes a long time to resolve their cases. Once an individual has been picked up for questioning, he/she is left alone to walk home, only in rare cases are people given bus transport . This makes people shun away from police.

There has been an increase in the number of traders in pesticides, some bogus ones have also come up with a lot of faked chemicals. For example, a sachet of Dithane M-45 costs U$ 3.00, a bogus trader comes with ten sachets of Dithane M-45 and sell each at U$ 2.00, then he brings along with him 2000 sachets of soybean powder. The first buyer gets the true benefit of the chemical and report to others the success , so the powder is sold within two days and the culprit is gone by the time people discover they have been cheated. In some cases a very poisonous chemical is sold to control a pest, but in the process it also kills livestock and people. The best example is the rat poison which is believed to come from Mozambique.

Due to lack of registration and legislation, no records are kept of chemicals in Malawi and it is therefore very difficult to treat cases of poisoning in rural areas as well as urban areas because no records of antidotes are kept. This is very true, because in many cases , management methods are given together with the dossier when a pesticide is being registered.

Government Action

Having seen the possible dangers the pesticides causes to the population and the environment, government opted to revise the legislation on pesticides and has undertaken the following steps:

IPM approach as first line of attack

As a first step in problem solving , the government is committed to use integrated pest management (IPM) as tool of first resort to combat pest problems in the country. Pesticides shall only be used as a choice of last resort. IPM awareness campaigns have been encouraged as research work in plant protection is geared towards IPM activities.

Pesticide legislation

The law on trading of pesticides ought to be changed to fit with government policies and to take care of any malpractice in terms of importation, distribution and the qualification of traders. This will also involve the keeping of a poisons register, so that the toxic and highly toxic chemicals are kept locked up and anyone buying from that stock should be recorded and instructed on how to use the chemical or directed to approved handlers. Such a register will also take the address of the buyer and the location where the chemical is intended to be used.

The introduction of a pesticide into Malawi shall also be regulated and only approved buyers shall import chemicals into the country. New pesticides shall have to follow strict screening exercises by the department of agricultural research or any other approved research body on behalf of the department. To this activity, FAO has been invited in the country to assist with setting up of laboratory materials for chemical analysis and also provide training to scientist and laboratory technicians in the area of pesticide analysis.

Pesticide accumulation shall be reduced by the introduction of an *on demand* system . This implies that even if the pesticides are a donation , we shall tell the donor what we need and how much we need for the coming two seasons. The donations of pesticide shall also be based on those pesticides which shall not have expired after six months of delivery for those which are supposed to be used within the season. Those pesticides which are supposed to be used the following season are supposed to last at least twenty four months after manufacture.

Ministries affected by pesticides

MOREA is the national designated authority for environmental issues and pesticides under the national authority come under their control. The role of MOREA is that of co-ordination. MOREA does not have expertise in the field of pesticide handling and management. Agrochemicals only come into full concern when there is a relationship with the environment. Since pesticides are used in the environment, they are always concerned. There is however no concerted effort from MOREA to deal with the scientists working in the other ministries which are directly affected by pesticides.

MOH deals with health related activities and their main concern is the provision of essential drugs to the population in the country. The ministry comes into picture when there is an issue of pesticide poisoning. Recently , this ministry formed the Pharmacy, Poisons and Medicines Board. This board has taken tremendous steps in coming up with a classification of pesticide poisons. The board is also working hand in hand with MoALD to come up with a pesticide registrar.

MoALD has the veterinary department and the research department , both use pesticides. The research department is the main user of pesticides in Malawi and has the largest stocks of pesticides in the country. This department with the extension department are the key players when it comes to controlling major outbreaks in the country.

Malawi contribution

Despite our inability not to formulate our own pesticides, we the pesticide users have a great role to play in reducing the risks in the development of agrochemicals and the following are our contributions.

1. Building facilities

We have laboratories which can be used for analysis as long as someone is ready to fund the purchase of the necessary equipment and train and keep the analysts. Added to this, there is the Malawi Bureau of Standards which can also do the analysis at a fee as long the technical standards are provided.

2. Personnel

We are willing to provide personnel to conduct field tests in the efficacy of the claimed chemicals be it an agricultural chemical or a veterinary one. This also includes provision of testing chambers in some cases.

3. Locations

There are areas in Malawi where chemicals have been used for more than five consecutive years, we are willing to provide these areas for environmental assessments as long as whoever works there works with our scientist and the publication in a completed draft form is presented to us before departure and the final publication in a journal or any other form can be sent to us.

4. Research

We have some research plans and results in chemical handling of the work we have done in handling pesticides can also be shared with member in our region and those interested.

Conclusion

As users of pesticides, we should be in position to say what we want and therefore demand the production of environmentally friendly agrochemicals. We can even indicate to *bonafide* donors what we do not want by politely giving them a list of non wanted chemicals into our country.

The network is very important to Malawi in many ways, some of which will be highlighted here. Due to this network we shall know what our neighbours are doing in terms of certain groups of chemicals and this shall be achieved by sharing information. We shall be in a position to locate where the best regional expert can be found in a specific area of study. We strongly feel this network should be on.

Country paper

MAURITIUS

Risk Reduction in the Development of Agrochemicals in the Afro-Arab Region

4 - 6 December 1996 -MAURITIUS

Dr. R. Sibartie

Introduction

Mauritius is an Island of approximately 1865 Sq. Kms situated in the south west part of the Indian Ocean, 800 kms east of Madagascar. The population is 1.1million comprising people of Indian, African, European and Chinese origin. English and French are the main languages, with English having the status of the official language.

Economic Activities

50 % of the population is economically active and the main economic activities are: agriculture, manufacturing and tourism. The per capita income for 1995 was U. S $2500.00. Until the 1970's Mauritius had a monocrop economy based on sugar. The sugar industry was the largest employer and sugar accounted for 90% of exports. In the 1980's the Government embarked on an ambitious program of economic diversification, to tackle the problems of unemployment and increasing external commercial deficit Export processing zones were set up in different parts of the island. Emphasis was laid on textiles and the tourism sector.

The export processing zone is now the largest employer and also the largest earner of foreign exchange followed by the tourism sector and third is the sugar industry

Table 1

Role of Sugar in the Mauritian Economy

Period	GDP	Employment	Exports
1970's	25 %	45 %	90 %
1980's	13 %	20 %	40 %
1990's	10 %	15 %	30 %

Agriculture

The area under cultivation is about 85,000 Hectares with 78% under sugarcane.
The sugar industry still plays an important part in the economy with a yearly production of about 600,000 tons of sugar. Other main agricultural products and area under cultivation are as follows

Table 2

Agricultural Production

1. AREA HARVESTED (Hectares)

	1991	1992	1993	1994	1995
Sugarcane	75,966	75,077	74,031	73,017	72,010
Tea	2,869	3,133	3,151	3,028	2,077
Tobacco	621	804	746	698	691
Foodcrops	5,496	5,856	5,880	6,342	6,770

2. PRODUCTION

	1991	1992	1993	1994	1995
Sugarcane	611,340	643,168	565,026	500,209	539,521
Tea	5,918	5,808	5,931	5,089	3,785
Tobacco	863	1,023	1,036	973	1,065
Foodcrops	64,090	72,070	79,050	81,466	97,534

Main Foodcrops (1995)	Amount Harvested/ Tons
Potatoes	15,846
Tomatoes	13,486
Onions	5,974
Groundnuts	1,100
Maize	1,000
Bananas	9,000
Pineapples	4,000

The sugar industry employs about 25,000 people. There are also about 35,000 small planters with small holdings, of which about 6,000 are involved in the production of tea, tobacco and foodcrops.

Even though agriculture is now relegated to the 3rd place, it still forms the backbone of our economy, especially because of the following reasons:

1. There is high added value
2. Sugarcane is resistant to diseases, cyclones and pests, and adept to the local climatic conditions.
3. The preferential Quota enjoyed for sugar in the European Union.

With a guaranteed market, the aim now is to produce about 650,000 tons of sugar yearly. This is expected to be achieved by increasing the area under cultivation that is; conversion of tea lands, irrigation, derocking the lands of small planters and by optimising the use of Agrochemicals.

Use of Agrochemicals in Mauritius

FERTILIZERS

The Mauritius Chemical and Fertilizer Industry Ltd is the only company manufacturing fertilizers in Mauritius.

The following table gives an indication of production, import and export of fertilizers.

Table 3

1. Total fertilizer produced for the last 3 years/ Tons:

93/94 : 72,232
94/95 : 73,650
95/96 : 80,359

2. Export tonnage for the last 3 years:

93/94 : 17,739
94/95 : 32,367
95/96 : 20,306

3. IMPORTS OF FERTILIZERS IN TONS

	1990	1991	1992	1993	1994
Nitrogenous Fertilizers	22,425	23,197	30,045	23,734	18,387
Potassic Fertilizers	30,805	26,614	26,672	23,833	23,578
Phosphatic Fertilizers	12,333	15,232	10,522	18,560	11,971
Total	65,563	63,043	67,239	66,127	53,936

Source: Mauritius Chemical and Fertilizer Industry Ltd.

The use of fertilizers in Mauritius increased from 64,245 tons in 1994 to 70,581 tons in 1995.

Pesticides

Mauritius is a net importer of pesticides. Both technical and formulated products are imported from different countries mainly from- South Africa, Europe, India, Taiwan, Israel and U.S.A. The yearly import of Pesticides is about 1,500 Tons, valued at 10 million US Dollars. There is only one company formulating water based Pesticides (Herbicides) in Mauritius from imported technical products with a yearly production of about 300 tons. Presently only a small amount is exported to Reunion island and Madagascar.

Pesticides imported are mainly used in Agriculture (92%) and the rest are used for public health, pest control in buildings, as wood preservative and for industrial purposes.

Table 4

Pesticide Usage in Mauritius

Main Uses	Type of Pesticide	Average annual imported quantity during 1993-1994 (In tons)	Estimated annual imported quantity of active ingredients for 1993-94 (In tons)
1. AGRICULTURE	Herbicides	920	462
	Insecticides	279	20
	Fungicides	140	104
	Others	24	5
	Total	1363 (92 %)	591 (95 %)
2. PEST CONTROL	Insecticides	70	5
	Others	8	
		17	17
	e		
	Total	95 (6.4 %)	22 (3.5 %)
3. INDUSTRIAL	Wood preservative	4	2
	Paint additives (fungicides and algaecides)		
	Total	18	7
		22 tons(1.52 %)	9 (1.5 %)
4. PUBLIC HEALTH	Insecticides	550 (Kg)	
	Rodenticides	450(Kg)	
	Total	1 ton (0.08%)	
TOTAL		**1481 tons**	**622 tons**

There are 11 importers of pesticides registered in Mauritius and Local sale is done through 120 registered pesticide shops.

Some 130 different pesticide compounds are registered in Mauritius under roughly 210 trade names.

Pesticide Usage

An annual average of 15 kgs of commercial products are used per hectare in Mauritius or about 1.5 kg of active ingredient. This is considered very high compared to other developing countries.

Herbicides constitute the largest group with 61% of total pesticide imports. A constant increase has been noted for the last five years probably because of shortage of labour. Insecticides represent 24% of imports followed by fungicides which is 10%. An increase in use of fungicides is also noted.(See table a)

LEGISLATION:

The Pesticides Control Act

The Pesticides Control Act came into force in 1972 to Control the Import, manufacture, fomulation, sale, distribution, transport and use of pesticides in Mauritius. The main purpose of this act is to protect the Environment and the Health of workers and the public.

The Pesticides Control Board

Under this Act has been Established a Pesticides Control Board under the Ministry of Health with a Chairperson and Secretary designated by the Ministry of Health.

Members of the Board are from different Ministries and Organizations concerned in one way or another with Pesticides. The Board is renewed every year. The Board usually meets once a month.

Table 5

Ministries and Organizations Represented on the Board

1. Ministry of Agriculture
2. Ministry of Health
3. Ministry of Labour (Industrial Relations)
4. Ministry of Environment
5. Central Water Authority
6. Mauritius Sugar Industry Research Institute
7. Mauritius Chamber of Agriculture
8. Mauritius Standards Bureau
9. A Representative of Dealers of Pesticides

The Pesticides Control Act provides for registration of all importers, distributors, and sellers of pesticides. All pesticides imported in Mauritius must be registered and approved by the Pesticides Control Board. A permit is issued for the import and sale of pesticides. The Board sets conditions for import, sale and storage of pesticides.

The Act provides for protection of workers handling pesticides for example hours of work with pesticides, provision of personal protective equipment and examination of workers.

Restricted and Banned Pesticides

A list of Banned and Restricted Pesticides has been prepared by the Board. This list is reviewed every year.

International Conventions

Mauritius takes part in the following conventions: The London Guidelines on Prior Informed Consent and under this procedure Mauritius has banned most of the pesticides in the list except for DDT that is restricted for use by the Ministry of Health for malaria vector control.

Under The Montreal Protocol, Mauritius is phasing out the use of Ozone depleting substances.

Basel Convention: Mauritius has already ratified the Basel Convention on transboundary movement of hazardous wastes.

Protection of workers

1. Screening Through a program of education, close supervision and monitoring. Of workers, very few cases of overexposure and accidental poisoning have been reported. Presently all workers in large sugar estates, in public and private sectors are being screened for cholinesterase level. This is done twice a year by the Government Analyst Division.

Table 6

Cholinesterase Check Program

Year 1995

Institutions/ Organizations	No. of cases	0-25%	25-50%	50-75%	75-100%	% overexposure
1. PRIVATE sugar estates and firms etc.	1094	-	-	12	1082	1.09%
2. GOVT. Bodies	299	-	-	3	296	1.00%
3. PARASTAT-AL Municipalities F.S.C etc.	103	-	-	-	103	-
4. HOSPITALS Env. & Occu/ Poisoning cases	67	8	6	11	42	37%
5. TOTAL	**1563**	**8**	**6**	**26**	**1523**	**2.6%**

Year 1996 (01.01.96 -- 26.11.96)

Institutions/Organizations	No of cases	0-25 %	25-50%	50-75%	75-100 %	% overexposure
1. Private Sugar estates and firms etc..	1171	-	-	29	1142	2.4%
2. Government Bodies	371	-	1	1	369	0.54 %
3. Parastatal (Municipalities F.S.C. etc)	112	-	-	2	110	1.78 %
4. Hospitals cases	31	2	4	4	21	32 %
TOTAL	1685	2	5	36	1642	2.6 %

. The Ministry of Health plans to extend this facility to all small planters since they are exposed mostly to highly toxic insecticides of the carbamate and organophosphorus groups.

. **Medical Examination** - It is mandatory by law to have all workers medically examined by a physician at least once a year. A medical fitness certificate for each pesticide worker has to be submitted every year to the Pesticides Control Board.

Again as mentioned earlier there is a plan to screen all self employed small planters.

. **Poisoning** -- Every year over 300 cases of pesticide poisonings are reported in Mauritius resulting in over 80 deaths. Most of these cases are intentional (90 %)

Fatal Pesticide Poisoning by Age and Sex (1994)

Age	Sex		Total
	Male	Female	
1 - 15	4	3	7
16 - 20	3	6	9
21 - 30	17	5	22
31 - 40	15	10	25
41 - 50	9	1	10
51 - 60	6	1	7
Above 60	5	1	6
Total	59	27	86

Source: Forensic Science Laboratory

Occupational and Accidental Poisonings occur because of

1. Use of highly toxic substances
2. Lack of supervision
3. Absence of personal protective equipment
4. Storage at home and in softdrink bottles.
5. Easy availability and lack of control on sale.
6. Suicide by pesticides is very high in Mauritius and will need a multidisciplinary approach to tackle this problem.

Protection of the Environment

The Pesticides Control Act and The Environmental Protection Act have provisions for the protection of the Environment from the harmful effects of Agro-Chemicals.

Several Laboratories have been set up to monitor the Environment for pollution caused by Agro-Chemicals. The **Central Environmental Laboratory** under the Ministry of Environment carries out routine examination of water and effluents for level of Agrochemicals.

The **Central Water Authority** monitors surface and underground water for residues of pesticides and other chemicals. Presently a joint project with the M.S.I.R.I is under way to detect levels of Agrochemicals in surface and underground water.

The **Ministry of Agriculture** has an ongoing radio and television program to educate farmers and workers use of appropriate pesticides, proper spraying techniques and safety.(annexed is the activities of the Ministry of Agriculture and the Ministry of Labour).

Hazardous Waste Landfill- A landfill is being built at Mare Chicose in the South of the Island for the disposal of pesticides and other hazardous chemicals.

Conclusion

Certain actions have been initiated to reduce risks associated with the use of Agrochemicals in Mauritius.

1. There is regular monitoring of the environment and workers health.
2. A program of analysis of vegetables and local fruits is well established.
3. Integrated Pest Management methods have been introduced to control certain pests and diseases.
4. Studies on botanical pesticides are being carried out to reduce reliance on synthetic pesticides

The Pesticides Control Act will be replaced by "The Dangerous Chemicals Act" for a better management of toxic chemicals in Mauritius.

A multidisciplinary approach is being taken to tackle the problem of intentional poisonings.

Country Report

PALESTINIAN TERRITORIES

Palestinian National Authority

Pesticide Usage In Palestine

(presented by Azzam Saleh)

Proceeding to Interregional Expert Group Meeting on Risk Reduction in the Development of Agrochemicals in the Afro-Arab Region

Port Louis, Mauritius - 4-6 December 1996

Table of Contents

List of Abbreviations

ARIJ = Applied Research Institute - Jerusalem

CEOHS = Center of Environmental and Occupational Health Sciences

EC = European Community

EPA = Environmental Protection Agency

IPM = Integrated Pest Management

M.O.A = Ministry of Agriculture

M.O.H = Ministry of Health

NGOs = Non Governmental Organizations

PARC = Palestinian Agricultural Relief Committees

PAN = Pesticide Action Network

PNA = Palestinian National Authority

UNEP = United Nations Environment Program

USDA = United State Department of Agriculture

WHO = World Health Organization

Abstract

Pesticides, when used properly have been of tremendous benefits to human being and environment, but when misused or used carelessly, they have caused considerable harm. Many pesticides are potentially toxic to higher animals and can be dangerous to all exposed to them. Pesticide residues all too frequently find their way into food, water and soil. Rural and urban populations are at times subjected to unnecessarily high levels of pesticides due to overspraying, improper storage, and burning or burial of pesticide-laden agricultural wastes.

In Palestine, pesticides are excessively used quantitatively and qualitatively. There are about 125 types of pesticides that are being used in Palestine with application rates ranging between 2.1 kg/donum and 8.5 kg/donum. Of these pesticides, about 49 % are insecticides, 34 % fungicides, 13 % herbicides and the remainder are fumigants, repellents, and others.

Pesticides are excessively used in the districts of Tulkarm, Jenin, Jericho and Gaza, where the under plastic agriculture is mainly practiced.

Safety measures in pesticide application are rarely applied. Proper dilution and application methods are still in need of more awareness.

Regulations controlling the pesticide marketing and use are available from the Jordanian and Egyptian mandates. The decades of Israeli occupation have affected the enforcement power of these laws. However, after the transfer of the authority to the PNA, there is an urgent need for a unified national regulations to control the pesticide use and marketing.

Integrated Pest Management (IPM) project has been launched on a regional level between Palestine, Jordan and Israel. This project needs to be supported and applied.

Clearly, improving farmers' understanding of the ecological system with which they are working is vital. This includes improved understanding of the importance of soil organisms and of pest-predator relationships and understanding of the concept of economic threshold. Education is the key to coming to terms with the problems of pesticide usage in Palestine.

Introduction

Applying pesticides requires many special skills and responsibilities. It is an important occupation on its own and an indispensable part of many other occupations. A person who apply pesticides or supervises pesticide applicators, must be sure pesticides are handled properly and safely. It is often necessary to identify pests and then select the best methods for their control. For the farmer's safety as well as for his family it is essential to understand the hazards of pesticides and how to avoid injury. Protecting the environment is also a major concern. Additionally, farmers need to be familiar with all laws regulating the use, storage, transportation, application and disposal of pesticides.

In this report the existing situation of the pesticide use in Palestine is demonstrated through the presentation of the results of several surveys and investigations made in Palestine about the pesticide usage .

The existing legislation and laws regulating the pesticide use in Palestine are also presented. In addition, the national plans of actions are also presented. Conclusions and recommendations are then developed.

I. Agriculture in Palestine

. **Area**: Within the total Palestine area (West Bank and Gaza Strip), of about 6. 16 x 10^3 square kilometers, or 6.16 million donums (Md), the West Bank covers 5.80 Md , and Gaza 0.36 Md . In The West Bank slightly more than 1.50 Md in 1991 was actually cultivated by Palestinian farmers with an additional 0.3 Md lying fallow. In Gaza 0.16 Md were under cultivation by Palestinian farmers . Since 1973 the area regularly used for agriculture has declined by about 6 percent in the West Bank, the decline being entirely in rain-fed lands. With close to a third of the land area used for marginal cultivation, grazing or fallow, and an unknown area being cultivated by Israeli settlers, the definition of cultivated area is necessarily vague. The area used for extensive grazing operations is uncertain, but traditionally may well have covered most of the eastern slopes of the West Bank, and some parts of the western slopes. The current area used for extensive grazing is smaller .

2. In the West Bank , family farms are dominant, notably in the western hilly areas, where until recently weekend farming became increasingly usual , also for livestock operations, as farmers worked in Israel during the week and family or labourers tended the farm. Land holdings are relatively large in the Jordan Valley, with absentee owners living in Jordan. Here share holding dominates, while cash land rent arrangement dominate in intensive farming in the small coastal zone and Gaza . Special tenant arrangement prevail in olive growing areas, where picking of fruits is delegated to 'tenant' farmers for a share of the crop. Current tenant arrangements are reportedly satisfactory to most farmers. From a macroeconomic perspective excessive fragmentation in some areas must have negative implications on efficiency. In the West Bank, holdings smaller than 50 donums cover 90 % of the agricultural areas. Gaza has a few very large farms operated by absentee land owners;

small, fragmented family farms dominate in terms of numbers , while larger holdings cover about half the area Excessive fragmentation of small farms has become an important issue . Similarly excessive fragmentation is also a problem in rain-fed areas, constraining efforts at mechanization. Dispersion of many small plots has reduced efficiency, and the willingness of farmers to invest .

3. Farm Population Distribution, and Farm Structure: Most Palestinians live in areas with modest agricultural potential : The western hilly areas , where rainfed tree plantation, field crop and livestock operation prevail. The least populated areas , the Jordan Valley and the semi coastal region have the most promising agricultural potential . Even Palestinian returning to agriculture are concentrated in the western hills. Gaza is very densely populated; here casual labor is most abundant on account of limited current employment opportunities and limitations imposed by Israel on employment and labor movement while most unsatisfied demand for labor in the agricultural sector may well be in the Jordan Valley. At present wage labor is largely used for irrigated vegetable cropping , animal husbandry and for short periods for tree crop picking.

4. Agro-Ecological Zones: From an agro-ecological point of view, the region call be divided in about seven distinct zones. The coastal region in Gaza has three zones:

- the north with relatively moderate rainfall and acceptable quality of ground water-
- the middle with less predictable, modest rainfall and highly saline ground water
- the south with less than 200 mm precipitation and very poor quality ground water, except near the coast.

The Gaza has sandy soils in the west , loess in the east and alluvial soils in the north-east . The West Bank has four zones: the semicoastal region, with nearly 600 mm of rainfall and alluvial and heavy terra-rossa soils, used for a variety of crops; the central high-land region, covering most of the West Bank, is mountainous (up to 1000 m) with relatively high annual rainfall, tapering off from north to south, often shallow soil depth, with olive and grape orchards with a scattering of plateaus used for a three year field crop rotation of winter grain , fallow and summer grain and vegetables; the eastern slopes between the Jordan Valley and tile central highlands, semi-arid with steep mountains and very little rainfall, largely used for grazing; and the Jordan Valley, 200-400 m below sea level , with sandy and calcareous soils, annual precipitation of about 200 mm, hot summers and mild winters suitable for off-season cropping of vegetables and semi-tropical fruit tree plantations. Palestine has about 20 different soil types. Although a number of soils are less suitable for agriculture, farmers have been remarkably adept at using the soils available to them to best advantage, notably in areas with shallow soils on the western slopes.

5. Typical Cropping Patterns: Agriculture is being characterized by its highly diverse and complex nature; in a relatively small area, at least seven agro-climatic zones exist where about 60 crops are grown, while total rainfall fluctuates between 700 and 100 mm annually, depending on the location. This diversity is a strength, giving farmers potentially several cropping pattern options; but it is also a weakness, as successful cropping patterns need to be highly area specific. With rain-fed agriculture dominant in the West Rank, agricultural systems reflect the high variability of rainfall; most traditional crops are grown in a low-risk,

low-input, low technology mode. Fruit tree plantations (olives, grapes, almonds) comprise 60 % of the cultivated rain-fed area, field crops (wheat and barely) about 35 %. Of the small irrigated area a little less than 60 % is used for vegetables and fruits, 12 % for melons and bananas and 25 % for citrus. In Gaza where close to 65 % of cultivated land is irrigated, citrus accounts for 55 % of the irrigated area, and consumes about half of all water used for agriculture The remaining irrigated area is used for vegetables, some of it for multiple cropping and Guava. Of the non-irrigated area about half is used for fruit trees (olives - some partially irrigated-, grapes, almonds), field crops cover about a third, the rest is planted with rainfed vegetables. Livestock shows less variability; extensive and more intensive forms of production exist, with extensive systems being most competitive in local markets.

6. Level of Technology : In most instances agricultural crop production in Palestine is more advanced in comparison to some neighboring Arab countries, but not as advanced as modern systems in Israel, parts of Europe or the USA. This is specially true for protected agriculture crops produced in polyethelen greenhouses, high tunnels and row covers along with crops planted through polyethelen mulch in combination with drip irrigation. Rainfed production has not witnessed a similar technology improvement although some technological packages exist to improve the water retention capacity of soils and introduce more productive cultivars to improve production, they are generally not being applied. While in general yields in Palestine from some rainfed and open field irrigated production of field and horticultural crops have doubled and even tripled since 1967, yields of more traditional crops have increased much less, with the exception of grapes . One should take into account the modest level of modern technology being applied prior to the occupation; however, the introduction since then of combination of new growing technologies, new crop cultivars, and better overall water and agronomic management has made considerable difference.

7. Technological progress has not been able to maintain the pace of the early 1970s, and has been particularly slow since the mid 1980s. Current technology, entirely of Israeli origin, is not necessarily the most advanced in regard to cultivar selection and yield potential, while drip irrigation technology, as used in open field agriculture, is not cost competitive with systems from other countries. For farmers in Palestine, not having ample opportunity to explore and test other methodologies and inputs has reduced competitiveness and efficiency. The overall husbandry in the cultivation of crops can also be improved. The vegetable crops are relatively high yielding , and fairly free of disease and pests; mineral nutrition programs are generally adequate. Nevertheless, land preparation, uniformity of planting, weed control, post harvest handling and marketing practices do need attention, especially if products from Palestine are to be exported. Without improvement, quantity and quality of any products is currently hardly competitive with countries having along history in export markets notably in the EC. This applies to irrigated, but also for rainfed crops. For example, grape vineyards in Palestine are abundant, representing a major source of revenue. Unfortunately, the state of the art pruning and training of grape canes is quite different today than is currently practiced in Palestine. The cultivars in use are of the seeded types and have extremely delicate grapes, which are suitable for wine, but not acceptable for the export market as a fresh commodity or raisins. Most vineyards are not using drip irrigation technology which is needed to maximize yield and water efficiency in water scarce environment. Equally, plums and other trees are generally planted and

husbanded in manner which does not enhance monetary returns, the olive tree husbandry, cultivar selection, picking and processing are extremely traditional , and substantial efficiency improvement appear potentially possible.

II. Pesticide Handling and Disposal in Palestine

Background :

As a result of the development of the agricultural sector in Palestine, pesticides are being used increasingly by the farmers, particularly in irrigated farming systems. Unfortunately, this increase in pesticide use has not been accompanied by a full understanding of the impacts of pesticides on human health, beneficial organisms and environment.

Pesticides are used in Palestine for the following purposes:

1. Control of the agricultural pests (insects, fungi, herbs)
2. Control of insects and parasites that attack the animals
3. Control of the vectors in the public health sector

Despite the fact that pesticides are intensively used in Palestine, little documentation is available about pesticide application intensity, types of pesticides used and disposal of the excess pesticides quantities and containers. However, few reports are available about this issue. These reports were prepared upon field surveys conducted by non-governmental organizations (NGOs), such as the Palestinian Agricultural Relief Committees (PARC), The Center for Environmental and Occupational Health Sciences (CEOHS), and Applied Research Institute - Jerusalem (ARIJ) between the years 1985 and 1992.

It should be noticed that all of the surveys were made in the period before the transfer of the authority to the Palestinian National Authority.

The survey made by PARC and issued in 1986 about the pesticides use and disposal in Palestine (West Bank and Gaza Strip), the followings were found:

1. Pesticides were intensively used in the Jordan Valley (Jericho district), Tulkarm, and Gaza Strip . The pesticides were mainly applied for tomato, cucumber, marrow, eggplant and fruitful trees. Table (1) shows the number of pesticides used in different areas according to the findings of (PARC) survey in 1986.
2. The farmers mixed the pesticides without any awareness about the adverse results that they might end up with, such as the less efficiency and the increase in toxicity. For example one of the farmers in the Jordan Valley area mentioned that he used to mix 6 types of pesticides together in one spray.
3. About 70 % of the pesticide application processes are made by the women and children. Adverse effects took place on the children and women health .
4. About 90 % of the farmers did not use protective clothes or apply any safety measure during pesticide mixing, dilution and application. Some farmers used to smoke and eat during pesticide application.

5. instructions for use were mainly written in Hebrew or English. The farmers did not apply the right concentration of pesticides and this lead to crop damage and abnormalities.
6. About 60 % of the pesticides were used as a preventive measure rather than a cure. The farmers were greatly affected by the propaganda of the producing companies.
7. In some cases, pesticide containers were re-used for water and food storage.
8. Storage of pesticides was made inside the houses close to food staffs. Empty containers were disposed of near the roads or the farm boundaries.
9. Soil fumigant (pre-planting treatment) such as Methyl Bromide was intensively used. Potential groundwater pollution is possible, especially in Gaza Strip.
10. Several pesticides that were internationally banned or suspended were still used.

Table (2) summerizes the results of the PARC survey.

The CEOHS in Bir Zeit University provides agricultural extension courses for the farmers in Palestine about the safe use of pesticides. According to the site investigations made by CEOHS in the early 1990's the following observations were noticed:

1. Pesticides were excessively used in the districts of Jordan Valley (Jericho), Jenin, Tulkarm, and Gaza. Pesticide use was ranging between 4 and 7 kg per donum of land for vegetables, in the West Bank above mentioned districts and 4.5 to 7.5 kg per donum in Gaza. Inside green houses the figure rose up to 8.5 kg per donum.
2. Huge mistakes were observed in determining the right amounts of pesticides needed and the method of application.
3. Pesticide storage did not meet the required storage specifications. Stores were very close to residential houses. Pesticide merchants were packing the contents of the large containers into smaller containers for retail marketing inside their shops without any safety measures and the small containers were without any labelling.
4. Most of the farmers, merchants and even the workers of the extension services had little information about the safety period.
5. About 10.5 tons of lindane (Hexanol and Hexazole) were used yearly for the control of parasites in animal cattle's.
6. Farmers had their agricultural extension about pesticide use either from commercial sources (agents of the producing companies), or from experience gained personally or from other farmers.

Although several conservations were made about the accuracy of the pesticide usage rates mentioned by CEOHS , other findings were ensured by other reports.

Present Situation of Pesticide Use in Palestine

As mentioned above an intensive use of pesticides was recorded in Palestine. According to a survey hold by the Applied Research Institute - Jerusalem (ARIJ), and issued in 1995, a total of 123 pesticides are currently being used. Among them 14 pesticides are

internationally suspended, cancelled or banned. Seven of these pesticides are members of the "dirty dozen" namely, Aldicarb, Chlordan, D.D.T., Lindane, Paraquate, Parathion, and Pentachlorophenol. However, the CEOHS listed another 13 pesticides that are restricted banned or cancelled and are still used in Palestine. Tables (3.1) to (3.5) show the pesticides being used in Palestine (ARIJ , 1995).

The results of the ARIJ survey although was conducted in the West Bank Districts, it reflects the existing situation in Palestine. However, in Gaza District and after the transfer of the authorities to the PNA the pesticide market was almost controlled.

As mentioned, the total cultivated area in the West Bank is about 2 million donums. Of this, only 300 thousand donums are fallow lands. It is estimated that 88.5 % of irrigated lands and 18.4 % of rainfed lands are treated with pesticides. The average seasonal consumption of pesticides in the West Bank districts was found to be around 2.1 kg/donum in open irrigated fields and 4.4 kg/donum under plastic, excluding usage of Methyl Bromide. The pesticides used are distributed as shown in table (4) according to type of pesticide.

The total quantity of pesticides used in the West Bank districts is estimated to be around 493.8 tons per year, while in the Gaza district, the total quantity of pesticide used is estimated to be around 80 tons per year. Methyl Bromide consists about 40.5 % of the total amount of pesticides used.

Districts show variations in the quantity and type of pesticide used depending on the cropping patterns, topography and climate. For example, out of 72 tons of sulphur used in the West Bank districts about 50 tons are used in Hebron district where grapes are the main crop pattern.

The total area treated with pesticides in the West Bank districts is 383,453 donum, 77 % of which is under rainfed farming and 23 % of which is under irrigated farming, while 18 % of total pesticide consumption takes place in the rainfed farming, the irrigated farming accounts for about 72 % of the total pesticide consumption due to the intensive nature of cropping methods used in irrigated farming.

It is estimated that the districts of Jenin, Tulkarm and the Jordan Valley (Jericho) consume about 61 % of the pesticides used in the West Bank districts. Vegetables (especially irrigated) have the highest pesticide consumption, accounting for 41 % of total pesticide use in the West Bank districts.

Pesticide Marketing

The main source of pesticides are Israeli manufacturing and distributing companies. Pesticides are marketed via local Palestinian merchants who rarely have information about pesticides from the Israeli distributors.

Most of the pesticides are labelled in Hebrew and farmers usually receive less than adequate verbal information from the sales clerk about usage, storage, and disposal of pesticides.

Pesticide prices vary considerably between merchants. Some prices were found in certain parts to be less than the factory retail value, bringing into question the quality of commodity being sold. moreover, it was found that pesticides are often sold without basic information such as expiry date.

Pesticide Handling and Disposal

Measuring, dilution and loading are usually the most hazardous steps in pesticide handling. According to the survey held by ARIJ, one third of the farmers in the West Bank Districts are not restricted to the recommended dosage, while 40 % of them do not measure the required doses accurately.

According to the survey 53 % of the farmers dispose the empty containers around or inside their farms after damaging them so that they can not be reused. In 52 % of the cases the excess spray is buried in the soil , while in 34 % of the cases it is sprayed again on tile same crop. However, in 9 % of the cases it is sprayed on adjacent crops.

Table (5) shows the trend of pesticide disposal practices by farmers in the West Bank districts after the survey held by ARIJ.

About 69 % of the farmers store their pesticides in special rooms at home or in the farm. Less than 1 % of the farmers store the pesticides inside their houses. Children were found in many cases participating in pesticide transporting, mixing and spraying.

It has been found that because of the high cost of protective clothes and lack of enough time 70 % of the farmers do not wear protective clothes while spraying .

Farmers awareness about pesticide use handling and disposal still need a lot to be done in order to improve it. Many farmers are aware of the toxicity of the pesticides, the safety period, the required safety measures and the effect of the pesticides on the health and environment. However, more education and extension is still needed.

The large number of farmers per extension agent does not allow for proper extension services. About one third of the farmers consult extension agents to decide upon the pesticide to spray, and even when information on pesticides is available, it focuses on purposes of use and recommended concentrations.

Mole than one quarter of the farmers had pesticide related injury cases. However, these cases were not restricted to the farmers themselves, but affected women and children because of their participation in the spraying, mixing, and transportation of the pesticides. About half of the reports of the skin injury cases mainly due to inadequate safety precautions and inadequate spraying equipment.

However, 83 % of the injured took appropriate action by going to clinics or hospitals immediately or after poisoning It worthy to say that about three quarters of the farmers interviewed by ARIJ believed that they develop immunity to pesticides with time. This reflects both the farmer ignorance of negative pesticide impacts and the frequent interaction between the farmers and the pesticides.

III. Legal Framework and Application Standards

Pesticide control in Palestine is governed by several legislative tools under the responsibility of different enforcement authorities. Laws in the West Bank districts and Gaza district are of different origin. While the laws in the West Bank districts are the laws from the Jordanian mandate, the laws in Gaza district are British and Egyptian mandates laws.

In the West Bank districts , the Agriculture law No. 92 for the year 1966 as amended by the law No. 20 for the year 1973 authorises the Ministry of Agriculture (M.O.A), to select the types of pesticides allowed to be used and to state the conditions for import and production of such pesticides, the licensing procedure and the registration steps.

In addition, this law authorizes the M.O.A to restrict the handling and use of some types of pesticides.

The Public Health law No. 43 for the year 1966 authorizes the Ministry of Health (M.O.H.), to test the agricultural products and food staffs produced from agricultural products for the pesticide residue and authorizes the M.O.H to confiscate and to damage the food staffs with excess pesticide residue above the allowed limits.

In addition Trade and Industry law No. 16 for the year 1953 authorizes the M.O.H to license the stores selling the pesticides.

However, the degree of reinforcement of these laws was questionable. During the decades of Israeli occupation and before the PNA received the agricultural authorities, policies and laws that may be in place officially seemed to be having little impact due to lack of enforcement authority. A black market existed for the distribution of pesticides that were forbidden in Israel. A merchant could seemingly sell any pesticide regardless of quality or of health and environmental considerations.

The pesticides used in Palestine were among these registered for use and sale in Israel as issued by the Department of Plant Protection in the Israeli Ministry of Agriculture.

Recently, after the transfer of authorities to the PNA, more control on the pesticide use and sale is being practiced in Gaza district. In the West Bank districts, the responsibility of the PNA on the agricultural aspects has just begun. Detailed investigations are now being made to control the market of pesticides.

A unified law for agriculture for Palestine is being now prepared and the work in national standards and codes of practice have just started. However, meanwhile, and until that the national legislation, standards, and codes of practices are ready, international standards such as WHO, UNEP, PAN, and EPA are recently used by different organizations working in the field of plant protection in Palestine. The specific standards to be applied depends on the funding government.

IV - Strategies for the Control of Pesticide Handling and Disposal

The PNA had launched an Integrated Pest Management (IPM) project for Palestine in cooperation with Jordan and Israel and sponsored by the USA Department of Agriculture (USDA).

Agricultural activity may be transformed into environmentally friendly activity through changes in work processes and procedures. The establishment of good agriculture practices, the advancement of integrated pest management, low-input sustainable agriculture and bio-organic agriculture present the agricultural community with promising challenges.

Crop-specific and slow-release fertilizers, plastic containers to prevent the infiltration of manure and silage to groundwater, farm kits for monitoring soil and water, and environmentally-sound approaches to pest and weed management are only some examples.

Although still in it's infancy, integrated pest management (IPM) offers an effective way of dealing with insect control problems and relies heavily on protection and conservation of natural enemies, parasites. predators and disease organisms that regulate or balance with populations of pests.

V- Country Practices

The IPM project was started in the beginning of 1996. In April, 1996 a training course was held in Jordan. Another training course was assumed to be held in Bissan (Beit Sha'an), in May 1996, but it was cancelled due to some political reasons.

The M.O.A also started a program for agricultural extension about safe pesticide use in all the districts of Palestine.

Several NGO's are working also in different awareness and extension programs, covering a wide range of the farmers in Palestine.

Conclusions and Recommendations

1. Pesticides are excessively used in Palestine. Application rate ranges between a minimum of 2.1 kg/donum and a maximum of 8.5 kg/donum were reported . The districts with the maximum pesticide use are Tulkarem, Jenin, Jericho and Gaza.

   Extension programs should be concentrated on these districts to reduce the application rates.

2. pesticides that were internationally suspended, banned, cancelled or restricted are still used in Palestine.

   More control should be practiced to prevent the admission and the sale of such pesticides.

3. Dangerous pesticide handling and disposal pratices are still existing among farmers.

   Education is the key to improved pesticide use and disposal. It is a highly desirable component of any pest control program. Training programs must cover safety aspects, focusing on the dangers of pesticides and their health and environmental effects.

4. Legislation and enforcement efficiency are not the same in the different districts of Palestine (West Bank and Gaza).

   More efforts should be done to prepare the national legislation, standards, and codes of practices.

   IPM project should be supported to optimize the pesticide use and save the environment.

5. Establishment of two main laboratories (in Gaza and the West Bank) for the analysis of pesticide residues or other chemicals in plant, soil and water.

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(Note: submitted were also 8 pages of tables and diagrammes)

Country Report

Kingdom of Saudi Arabia

Ministry of Industry & Electricity

A work sheet presented for the Regional Meeting for developing a program for establishing a network in the Arab and African Zones to eliminate the risks of the development of the Agricultural Chemicals Mauritius, 4-6 December 1996

Abdullah Sulaiman Al Nujaidi

Introduction

Due to the global considerable development in the field of science especially chemicals and agricultural chemicals in particular and as natural results for this development, consequent risks and damages may arise as side effects for a certain substance.

Being a developing country, the Kingdom of Saudi Arabia seeks by all means to prevent any possible chemical risks to occur on its territories and exerts efforts to prevent the entry or spread of any substance that may have a bad or negative effect through the assistance of the concerned Agencies such as the Ministry of Industry & Electricity, Ministry of Agriculture and Water, Etc...

The Kingdom participation in this program indicates clearly the care and interest given by Saudi government care for keeping the country or its territory away from any chemical risks in general.

I- The Kingdom of Saudi Arabia.

Brief information on the Kingdom and some Agencies concerned with this field (Agricultural Chemicals) will be highlighted as follows:

- Geographical Location : western south of Asia.
- Area : 2.250.000 Km^2
- Rain : Little
- Population : 16.929.294 as per 1992 Census
- Religion : Islam.
- Capital : Riyadh
- Currency : Saudi Riyal

II- Agencies Concerned with agricultural chemicals:

1. **Ministry of Industry and Electricity:** the MOIE is generally supervising the industrial sector at the Kingdom, undertaking and implementing the industrial plans and policies aiming at encouraging and expanding the industrial fields among which is the industry and production of agricultural chemicals in view that It is the Agency concerned with the issuance of all industrial licenses and consequently the first Agency that will be responsible for controlling factories and production in general. In addition, the MOIE is assigned to undertake the industrial projects on a right basis in order to establish the principle of free competition through which the consumers interest and a stable and balanced development for the industrial sector will be realized.

   Among the facilities provided by the MOIE in supportive of encouraging the industrial sector are the following:

   1- Exempting the machinery, equipment and raw materials from customs duty.
   2- Granting lands at the industrial cities with nominal fees.
   3- Providing actual exemption for national products within the government purchasing,
   4- Imposing customs duties on the foreign competitive products to protect the national product.
   5- Exempting the project capital shares owned by the partners and foreigners from the company taxes.
   6- Providing industrial loans in coordination with the Saudi Industrial Development Fund (SIDF)
   7- Others.

2- Ministry of Agriculture and Water

This Ministry is supervising the agricultural sector at the Kingdom, undertaking and implementing the agricultural plans and policies bound to expand the agricultural land area and encourage all forms of agricultural investment and thus It is the Agency which is mainly dominating and controlling agricultural fields and sectors.

Agricultural chemicals are divided into three sections:

1- Chemical fertilizers
2- Pesticides
3- Growth inhabitants.(plant growth regulator)

A detailed presentation for each section will be as follows :

Chemical Fertilizers

As a response to the industrial development in the Kingdom, SABIC was established to produce Petrochemicals among which are the following fertilizers :

Fertilizer	Capacity / ton
Urea	320.000
Phosphate	190.000
Compound	57.000
Liquid	8.000 approx.
Total	575.000

In addition to other factories as follows:

Type of Fertilizer	Producing Factories	Capacity Ton.	Licensed Factories	Capacity	Total	
					No. Fact.	Capacity
Compound	2	45000	2	6100	4	51100
Liquid	3	16000	7	6710	10	22710
Total	5	61000	9	12810	14	73810

Imports during 1994 :

Fertilizer	Quantity / Ton
Urea	5362
Nitrogen	1855
Phosphate	3134
Potash	4135
Mixtures	15188
Total	29674

Thus, total produced and utilized quantities will be as follows:

Source	Quantity / Ton
Local production (SABIC)	575000
Local production (others)	61000
Imports	29674
Total	**665674**

Pesticides

Though these compounds are widely utilized for fighting pests and increasing production and providing food, maltreatment with these compounds disturbs the animate and inanimate environmental system.

Hence, the Kingdom of Saudi Arabia maintains a number of certain procedures towards these compounds among which is the promulgation of the Royal Decree No. 19 dated 10/1/1396H which approved (the Regulation of Dealing In Agricultural Insecticides).

The following is a highlight for some clauses:

1- The term "Pesticides" referred to herein this regulation means the agricultural pesticides which shall include any element, substance or compound that may be used for the purpose of preventing, exterminating, expelling, attracting or eliminating all kinds of insects, moths, harmful grass, fungi or any other creatures that may be harmful to the animals or plants.

2- A Committee formed by the Ministry of Agriculture shall be authorized to consider the subjects stipulated in this Regulation.

3- a) It is not permissible to deal, with import or put pesticides to circulation before obtaining a permit from the Ministry of Agriculture in accordance with the conditions indicated in the Resolution issued by the Minister of Agriculture and this permit will be valid for renewable five years.

b) The term " putting to circulation" stated in item (a) shall include production, sale or preparation of pesticides for trading purposes.

4- The Ministry of Agriculture shall define kinds of pesticides permitted for trading and the conditions and specifications required.
Also, the Ministry shall develop rules pertinent to the extremely dangerous and new pesticides. These rules are bound to organize the usage of pesticides to protect the Man, animal and plant from damages and risks that may arise from misuse.

5- Imported or locally produced or prepared pesticides put for circulation must be filled in tightly closed packages that will bear labels to contain the information required.

6- Whole or partial clearance for imported or locally produced pesticides is not allowed before obtaining the approval of the Ministry of Agriculture.

7- a) Advertisement or promotion shall not be allowed for any agricultural pesticide in a way which violates its characteristics or that will be confusing to the pesticide users. Advertisement for the pesticides which are not licensed for usage in the Kingdom is absolutely forbidden.
b) The violation of item (a) shall be rendered as a trading cheat.

8- Those who violate clauses (3,5,6) of this Regulation shall be warned.

9- The concerned officials shall be committed to prove the stated violation and shall be permitted to have access to any shop, store, plant or any other place concerned with producing, trading or circulation of the agricultural pesticides and to examine the respective records and licenses and take samples from the suspected pesticides for testing.

To apply for a license for dealing with pesticides, a number of procedures and application forms should be completed as follows :

License application form for dealing in pesticides

1- Firm Name :
2- Firm Address :
3- Name of Owner :
Id Card No Issued in dated
4- Name of Manager;

a) ID Card/Passport No Issued in dated
b) Qualifications:
c) Certificates of practical experiences :

Issued by dated

Obligation

I, the owner of the firm whose my name above mentioned hereby certify that the above mentioned statements are correct and upon my responsibility and I undertake not to violate the provisions of the Regulation of Dealing in Pesticides and the instructions notified to the firm through the Ministry of Agriculture and Water or other government Agencies and in the event I broke any of the provisions stipulated I would be liable to penalty as stated by the Regulation.

Upon the Above witness my signature

Firm Stamp Firm Owner :
Signature:

Attested/General Manager,
Agricultural Research Dept.
and Head of Pesticides Committee

Firm stamp:

Name :
Signature :
Official Stamp

Ref Date Enclos.

Application form for the technician in charge of selling and promoting pesticides

1- Firm Name :

2- Firm Address :

3- Name of Owner :

4- Name of Manager :

5- Name of technician in charge of selling and promoting pesticides

ID Card/passport No: Issued in Dated

a) Qualifications :

b) Certificates of practical experiences:

Issued by Dated

Obligation

I, the technician whose my name is above mentioned, hereby undertake to keep the provisions stipulated in the Regulation of Dealing in Pesticides and instructions promulgated by the Ministry of Agriculture and Water or by other government Agencies and to notify the Ministry of Agriculture and the Firm owner officially with my intention to have my contract terminated before two months of the expiry date and in the event I broke this, I would be liable to the penalty as stated by the Regulation..

Upon the above witness my signature
Name of technician :
Signature :
Date :

Name of the Owner or Manager of the firm:
Signature:

Firm Stamp :

Attested/General Manager, Agricultural Research Dept. and Head of Pesticides Committee

Name :
Signature :

Official Seal:

Required documents to obtain a trading License for circulating Pesticides:

1. Attested copy for the Commercial Registration in which the agricultural activity should be covered.
2. Attested copy for the Power of Attorney in case the firm is not possessed.
3. Copy for ID card of the owner of the firm.
4. Attested copy for the contract of rent or the Title Deed of the firm (the office - stores - pesticide shops)
5. Attested copies for qualifications and certificates of practical experiences for all technicians in charge of selling the pesticides with copy of their ID card or passport and Iqama for expatriates.
6. Filling in the license application form for practicing pesticide trading, form No 1 to be completed by the owner of the firm.
7. Filling in the application form of the technician in charge of selling the pesticides, form No 2 to be completed by all technicians.
8. A letter or certificate From the Civil Defense indicating that all stores and shops of pesticides meet the conditions of safety and are subject to the protective supervision.
9. Approval letter from the Municipality for the location of pesticide shops.
10. A sketch for the office, stores and shops of pesticides to illustrate:

    a- Location and access roads.
    b- Number of rooms and area.
    c- Other utilities.

Conditions for the registration of pesticides at the Kingdom of Saudi Arabia:

1. The application of the final compounds should indicate the registration reference number, date of issue, the compound card and present address.
2. Registration at the country of origin: Each application should be supported with a letter (certificate) of registration of pesticides from the concerned Authorities at the country of origin to indicate that the pesticide (the compound) is being registered under (the name and address of supplier) and the registration reference of such pesticide.
3. Composition and preparation: Nomenclature and concentration of all elements both active and added substances (wetting agents, emulsifiers, solvents, coloring agents etc) should be defined. Furthermore, brand and chemical names for all elements will be mentioned. The concentration of active substances in solid and spray compounds should be clarified on weight / weight (gr/kg) basis and in case of paste like liquid compounds, the concentration will be on weight / volume (gr/Lit) basis. Moreover, the purity degree of the active substance along with the counted or estimated quantity of the pure active substance must be clarified.
   The aforementioned information will enable the Ministry of Agriculture to define the right percentage of the active substance in the finished products.
4. Name and address of the supplier of the pure active substance are to be clarified. If the product supplier was not the original producer of the pure active substance, a letter should be obtained from the original producer of the pure active substance indicating that the pesticide supplier will buy the pure substance from the original producer for usage in the pesticide preparation. These information are very important in view that the percentage of the active substance is different by the various supply sources and there may be toxic mixed particles in the product that will have harmful effect on man, animal and environment.
5. A presentation for the detailed processing of the product will be forwarded. This process should include exterior and interior heating reactions and the intermediate operations that may arise from heating and if there are mixed particles that are attained during the process as well as the temperature of mixture and the duration of each process e.g. mixture, blending, heating etc.
   Furthermore, all stages of preparation should be highlighted as these information are necessary for defining the physical and chemical characteristics such as color, smell, superficial or specific density (Kg/ lit), viscosity (sq mm/sec) ignition (flash point), erosion, explosion and stability of the pesticide.
6. Clarification of the analytical methods in supportive of verifying the product composition and the purity of the active substance.
7. Information on the stability and period of storage will be presented. In such case a certificate will be enough to indicate that too much loss for the chemical and physical characteristics of the pesticide will not take place after one year storage under the conditions and circumstances prevailed in the Kingdom of Saudi Arabia, taking into consideration the storage fast tests which are undertaken under a temperature of 54° centigrade for 15 days and the companies should keep the Ministry of Agriculture informed that they are doing tests or study for the pesticide for a year.

8. The minimum and maximum limits of purity of the active substance used in the finished product will be clarified .
9. Five copies for the product card in Arabic should be presented.
10. Pesticides must be imported only from the original producer, or the pesticide chemist or from their authorized dealers.
11. Authority letter will be issued by the pesticide producer for the Saudi firm which shall import the pesticide to act as a permit for importing and dealing with the some throughout the Kingdom of Saudi Arabia .
12. The pesticide Card (Label) at the Country of Origin should be enclosed.

Compounds which had duly been registered in the Kingdom of Saudi Arabia are listed in Annex (1).

Since some compounds cause great damages, the Kingdom in collaboration with other numerous International Agencies elaborated a list of prohibited pesticides (see Annex (2)).

After reviewing some rules which control such compounds, the following is an elaborate for the volume of the local production and imports of pesticides:

Number of producing factories	Capacity Ton	Number of Licensed Factories	Capacity Ton	Total Number of Factories	Total Capacity
3	6113	9	37400	1212	43513

The Kingdom imports of pesticides by types in 1416H:

Type	**Liquid 000 Lit**	**Powder / Ton**
Insecticides	86	346
Fungicides	110	291
Herbicides	654	37
TOTAL	**851**	**674**

III Nematode (Growth Inhibitors)

These compounds are treated like pesticides and still procured by imports whose volume of market was 1055 tons in 1994.

Eliminating the risks of chemicals

Eliminating the risks of chemicals are one of the safest means to establish a sound infrastructure and the conditions of registering the pesticides at the Kingdom helps also in this way. However, there are some points that should be taken into consideration as follows: :

1. All local and international sectors should cooperate in order to enhance the awareness towards man's health and environment.
2. Information on the chemical substance e.g. effect, negative results etc. should be available .
3. Instruction card should be put on the packages and the user should read these instructions very well .
4. A strict control must be practiced over the usage of the agricultural chemical compounds especially these used in fresh crops.
5. Urging and demanding the advanced countries to eliminate restrictions against exporting their technologies necessary for developing the methodology of agricultural production.
6. Establishing centers authorized to develop rules for defining quantities of pesticides permitted for usage in accordance with the International Standards.
7. Designating the experiences of the countries in the field of agricultural chemicals.
8. Holding a periodical meeting to be acquainted with the international efforts exerted and the results attained.
9. Application of the specifications pertinent to the maximum limit of toxic residues permitted in the vegetables with the necessity of providing examination units.
10. Percentage of mixed particles should be identified.
11. Getting rid of the packages of the agricultural chemicals in a proper way after usage.
12. Utilizing some safe methods like using the originators of insect diseases for controlling the same diseases as means of Biological Control or Microbiological Control among which are the Fungi, Virus, Bacteria, Protozoa and Nematodes as well.
13. Giving too much emphasis on the Insect Pathology to find substitutes for the harmful compounds.
14. Reducing the probability of the existence of breeds resistant to pesticides.

Conclusion

Based on the above, we can say that the Saudi Government is greatly interested in the development of the agricultural industrial production, avoiding any environmental effects on the animate or inanimate creatures, supporting by all means all methods in supportive of increasing production and maintaining healthy and sound environment.

Country Paper

SOUTH AFRICA

RISK REDUCTION IN AGROCHEMICAL DEVELOPMENT IN SOUTH AFRICA

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0001

Republic of South Africa

The production and use of agrochemicals

Pesticides worth $ 210 million were used in agriculture during 1995. Excluded are the 230 metric tons of DDT used for malarial mosquito control, other pesticides used in public health and wood preservatives. As far as the agricultural use is concerned little growth has been reported over the past decade. The most important markets are maize, sugar cane, potatoes, wheat, deciduous fruit and citrus.

A number of active ingredients are manufactured in South Africa. These include atrazine, simazine, propazine, terbuthylazine, diuron, MSMA, EPTC, alachlor, 2,4-D, MCPA, bromoxynil, trifluralin, glyphosate, tebuthiuron, aldicarb, mancozeb, permethrin, cypermethrin, fenvalerate, propoxur, methomyl, dichlorvos and imazalil. A fair volume of pesticides being manufactured are exported.

In 1994 a total of 2 235 169 metric tons of fertilizer were sold in South Africa. N accounted for 407 915, P for 117 204 and K for 101 327 metric tons. Fertilizer sales have been static during the last ten years and there has been no growth.

Framework for Pesticide Risk Reduction Activities

The most important Act of Parliament governing pesticides in South Africa is the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) which is administered by the National Department of Agriculture. According to the above-mentioned Act no pesticide may be sold in South Africa unless it has been registered in terms of the Act. All pest control officers (PCOs) must also be registered in terms of the above-mentioned Act.

The Act makes provision for a Registrar who is responsible to carry out the stipulations of the Act, the regulations promulgated thereunder and registration guidelines. The Registrar is advised on all policy issues by the Standing Interdepartmental Advisory Committee for Safeguarding Man against Poisonous Substances (INDAC), e.g. approvals of new active ingredients, new end-uses, withdrawals, restrictions, bannings, etc. All cases of poisoning (human and animal) and environmental problems are also reported to INDAC. Numerous instances of restrictions, withdrawals or bannings were instigated upon the advice of INDAC.

The following government departments are represented at INDAC:

- National Department of Agriculture
- Department of Health
- Department of Environmental Affairs and Tourism
- Department of Water Affairs and Forestry
- Department of Labour
- The Medicines Control Council (MCC) and the Agricultural Research Council (ARC) also has representation on INDAC.

There is close cooperation between the Departments of Health and Agriculture in the registration procedure, labelling requirements, hazard classification and risk-reduction steps (e.g. education and training). Personnel from both departments are also involved in the training of PCOs.

Many of the risk-reduction activities engaged upon by the Department of Health falls under a number of other Acts administered by that department. In January 1993 the "STOP" Project (Safety Towards Our People) was initiated as a national primary health care project. This arose as a result of the concern about the number of poisonings that occur each year as a result of potentially hazardous substances. The project was to some extent prompted by the World Health Organisation's request for increased awareness among the public and certain professional and other groups. The aim is to inform young people and in doing so foster a positive attitude in the adults of the future. A trial was run during 1993 for a period

of six months in 27 selected schools in the Northern Province. The project has since then been expanded to other regions of South Africa. The aim is to extend the project to all regions of South Africa by 2010.

Poisoning from any pesticide has been declared a notifiable medical condition in terms of section 45 of the Health Act, 1977 (Act No. 63 of 1977). Notification of poisoning is obligatory. A form was compiled in the eighties which the Department of Health's environmental health officers complete when doing a follow-up visit to cases of poisoning and deaths. During the follow-up visit they give guidance to those involved on the safe handling of pesticides to prevent such an incident from recurring. Underreporting of pesticide poisoning is a problem and the World Health Organisation has recognised this as a major global problem.

Group 1 Category B Hazardous Substances has been declared on 25 March 1977 under the Hazardous Substance Act, 1973 (Act No 15 of 1973). This group of hazardous substances consists of the extremely highly hazardous pesticides. This implies that a general dealer engaged in retail trade, or the responsible employee of a cooperative agricultural society or company, or a cooperative trading society, must apply for a licence for the sale or supply of products which contain any Category B group 1 hazardous substances. Records must be kept and label specifications must be adhered to. It also includes the disposal prescriptions concerning empty containers.

In 1974 a Code of Practice was compiled by the South African Bureau of Standards (SABS) for The Aerial Application of Agricultural Remedies. This was done on request of various industries, government departments and the public. If the responsibilities of the various parties are undertaken with the necessary care, this highly specialised application technique can be used to the benefit of agriculture, forestry and public health without unnecessary pollution. Because of the fact that the SABS Code of Practice has no legal mandate, the Department of Health has incorporated this Code into regulations under the Hazardous Substances Act, 1973 (Act No 15 of 1973) which assures legality.

The agrochemical industry as well as all government departments concerned, met during 1985 and resulting from this discussion the Cabinet was approached to approve a single, uniform classification system, based on the International Maritime Dangerous Goods Code. Approval was granted and authority given to the South African Bureau of Standards to implement the system. It was decided that the labelling guidelines of the Food and Agricultural Organisation of the United Nations should be adopted to ensure a better classification and labelling system. Government approved the introduction of these new systems. The Department of Health is responsible for the national classification of all pesticides. Use is also made of GIFAP pictograms.

The Crop Protection and Animal Health Association (AVCASA) also plays a major role in pesticide risk reduction. AVCASA members promote the responsible use of pesticides nationally through a Code of Conduct, training programmes, guidelines, and the reduction

in use of crop protection remedies and alternative pest management strategies. Although there is no legal mandate as such for these activities, these are always undertaken in close collaboration and consultation between the Department of Agriculture (including INDAC members) and the ARC.

Elimination of hazardous pesticides

One of the requirements of Act No 36 of 1947 is that the registration of a pesticide may not be contrary to the public interest. This has enabled the Registrar to take steps (upon the recommendations of INDAC) to restrict or ban pesticides to reduce unacceptable risk to humans and the environment.

Over the last 20 years a number of pesticides have been withdrawn, restricted or banned. These actions were undertaken to serve the public interest, the environment and the production of safe food. The following is a short summary of these actions:

Aldrin. Its use has been severely restricted since 1970. In 1980 its use was limited to the control of subterranean termites. In 1992 the product was voluntarily withdrawn from the South African market.

Arsenic. All agricultural uses of inorganic arsenic compounds were prohibited in 1970 and banned in 1983 (except on citrus where it can still be used to correct the sugar-acid ratio).

Atrazine. Certain label amendments were implemented during 1995 to prevent contamination of ground and surface water.

BHC. Restrictions were imposed in 1970 on its use in agriculture. All uses in agriculture were prohibited in 1973. In 1983 the acquisition, alienation, sale or use was banned. Lindane is still registered for some end-uses.

Camphechlor. It was withdrawn in crop protection in 1970 and as a stock remedy in 1985.

Chlordane. It was suspended from all uses in 1970 except for the control of ants and termites in homes, home gardens and in agriculture. In 1993 the registration holder voluntarily restricted its use to stem treatment of citrus and vineyards and to the treatment of structures by PCOs.

Chlordimeform. Withdrawn in 1978.

Chlorobenzilate. Withdrawn in 1978.

2,4-D (dimethylamine salt). In 1991 a ban was placed on ail aerial applications in Natal and it has been totally prohibited in parts of the magisterial districts of Camperdown, Pietermaritzburg and Richmond.

2,4-D esters. In 1980 it was withdrawn voluntarily by industry from all agricultural uses in the Western Cape. In 1991 all applications of iso-octyl ester in Natal were prohibited.

2,4-DB (sodium salt). In 1991 a ban was placed on all aerial applications in Natal and it has been totally prohibited in parts of the magisterial districts of Camperdown, Pietermaritzburg and Richmond.

Dicamba. In 1991 a ban was placed on all aerial applications of all salts in Natal as well as all uses of dimethylamine salt in parts of the magisterial districts of Camperdown, Pietermaritzburg and Richmond.

DDT. Its use in agriculture was severely restricted in 1970. It was withdrawn from all uses in agriculture in 1976. The acquisition, alienation, sale or use of DDT was banned in 1983, except its use in the control of the malarial mosquito by the Government.

Dieldrin. Its use was severely restricted in 1970. All registrations were withdrawn in 1980. The acquisition, sale, alienation or use of dieldrin was banned in 1983.

Dinoseb. Revision of registration was finalised in 1993. As from 31 March 1993 it has only been allowed on peas and potatoes. All registrations were withdrawn on 31 March 1995.

Endosulfan. Registration on fodder crops was suspended in 1970.

Endrin. Its use was restricted to forestry pests in 1970. The registration was voluntarily withdrawn by the registration holder in 1980.

Heptachlor. Registration was withdrawn in 1976.

Kepone. In 1971 INDAC decided not to allow this product in South African.

Leptophos. Registration was suspended in 1980.

MCPA (dimethylamine salt). In 1991 a ban was placed on all aerial applications in Natal and it has been totally prohibited in parts of the magisterial districts of Camperdown, Pietermaritzburg and Richmond.

MCPA (potassium salt). In 1991 a ban was placed on aerial application in Natal. MCPB (sodium salt). In 1991 a ban was placed on aerial application in Natal.

Methyl bromide. A decision was taken by INDAC to withdraw all small container (680 g) registrations during 1995.

Monocroptophos. In 1989 it was withdrawn voluntarily from all agricultural uses in the Western Cape.

Monofluoroacetic acid. In 1971 INDAC decided not to allow its use. In 1993 INDAC decided to allow its use only in a toxic collar in terms of the Hazardous Substances Act, but subject to strict regulations.

Parathion. All registrations on deciduous fruit and vineyards were withdrawn in 1972. In June 1993 it was withdrawn voluntarily from all uses on beans, coffee, cotton, groundnuts, mangoes, ornamental plants as well as for the control of short-horned grasshoppers on various crops.

Triclopyr. In 1991 a ban was placed on aerial applications in Natal.

TDE. It was withdrawn in agriculture in 1970.

Reduction in pesticide use

The ARC is involved in the development of improved application techniques. These were started in the early seventies by the Plant Protection Research Institute (PPRI) to improve some of the pest control practices used at that time for locust control and were later extended to other areas. These activities were started to lessen the negative effect of pesticides on the environment and to improve the effectiveness of spray applications.

The following will serve as examples where good results were obtained by improving application techniques:

Cotton. By using threshold values in decision-making the number of sprays was reduced from 14 to 5. Improved application techniques (drop arms, droplet size, volume rates per ha and application timing according to meteorological conditions) also made the applications more effective. Although no statistics are available it is estimated that 30% less insecticides are currently used on cotton compared to 20 years ago.

Migratory brown locust. In the seventies and eighties BHC dusts were widely used in the control programme. Research conducted by the PPRI and the Directorate Agricultural Engineering resulted in the development of ULV application methods and later led to the use of organophosphorus and pyrethroid pesticides. The current locust control programme is much more successful and poses fewer environmental problems than the previous programmes. It is now possible to contain outbreaks to natural breeding areas. There is also a move away from organophosphorous insecticides to pyrethroids as a result of a number of cases of accidental poisoning of workers.

Quelea. Research work conducted by the PPRI led to the development of ULV spraying methods. Guidelines were established to ensure that applications will only take place under the most suitable meteorological conditions to ensure efficacy and to reduce environmental contamination and minimize risk to wild life. In the past, quelea control programmes caused a number of unfortunate environmental disruptions. Improved control procedures led to a significant reduction of these problems.

Environmental impact of fertilizer applications

Little is known of the environmental impact of fertilizers in South Africa. In a study of phosphorus transport in the Berg River (Eastern Cape) it was found that in winter (i.e. the wet season) between 21 and 12 % of the P load is point source. The rest is nonpoint source, mostly washed off from agricultural fields. A significant proportion of this load is likely to stem from agricultural fertilizers.

This is the best study to date. It is likely that in most intensive cultivated areas that nonpoint sources of nutrients from agricultural fertilizers form a significant part of the total nutrient load.

Promotion of alternative pest management strategies

Although there are at this state no targets being set to reduce overall pesticide use, the National Department of Agriculture supports Integrated Pest Management (IPM). The previous specialist research institutes of the Department (recently transferred to the ARC) has for many decades supported the use of biological control agents in pest control.

Noticeable successes were achieved in this field. These include pest control on citrus, deciduous fruit, cotton as well as noxious weeds. Examples are the following:

Cytobagous salvinia to control *Salvinia molesta*

Putasson nitens to control *Gonipterus scutellarus*

Zeuxiciiplosis giardi to control *Hypericum perforatum*

Uromycladium tepperianum to control *Acacia saligna*

Rodolia cardinalis to control *Iceria purchasi*

Aphelinus mali to control *Eriosoma lanigerum*

These successes are well documented and South Africa is one of the leading exponents of IPM and biological control in the world.

The Plant Protection Research Institute (PPRI) has recently developed a new mycoherbicide„Stumpout“ based on the fungus *Cylindrobasidium laeve*, which is one of the white wood-rot fungi which is commonly found on dead wood in many countries of the northern hemisphere. This fungus was isolated and developed into a treatment for cut stumps. Application for registration has been lodged with the National Department of Agriculture for registration of "Stumpout" as a fungal inoculant to treat and kill black (*Acacia mearnsii*) and golden (*A. pycnantha*) wattle stumps. These two species are invasive and have infested large areas in South Africa. This product will be applied to the stumps after felling. It will be easy to apply and will pose no hazard to the worker and the environment.

III Networking

The Department of Environmental Affairs and Tourism is currently investigating the establishment of a Designated National Authority (DNA) to enable South Africa to participate in PIC and IPCS. A cabinet memorandum will be prepared during February 1997 to inform the South African government on the implications (e.g. capacity building) and responsibilities involved if the memorandum of understanding is signed by South Africa.

If approval is given to establish a DNA in the Department of Environmental Affairs and Tourism it is envisaged that networking will be conducted through the DNA. It will consequently serve to coordinate all actions, liaise closely with all relevant governmental departments and facilitate communication with other DNAs, WHO, FAG, UNEP and UNIDO.

IV Conclusions

South Africa is an important user and producer of agrochemicals. Although the domestic market is fairly static the number of pesticides manufactured in South Africa has increased quite dramatically over the past decade.

There is a well-developed legal framework to control the sale and use of pesticides. A number of pesticides have been restricted or withdrawn from the market because of environmental and human health problems.

There is strong support for development of alternative control methods (egg. improved application techniques, integrated pest management and biological control agents) as a means to reduce pesticide risk.

The proposed establishment of a Designated National Authority will enable South Africa to take part in PIC and IPCS and will facilitate networking.

Country Paper

SUDAN

AGROCHEMICALS

(prepared by: Mohammed Omar El Siddig)

INTRODUCTION

Sudan being the largest country in the Afro-Arab region with a total area of 2.5 million km^2 has vast, extended cultivable areas amounting to about 84 million hectares (200 million feddans) representing one third of the total area. However only about 10-15% of this area is cultivated and merely 2% is irrigated. Sudanese economy is primarily based on agriculture which contributes with more than 1/3 to GDP & 90 % to exports revenues.

The exploited area is cultivated with all sorts of crops but even through under-utilized due to several obstacles. One of these obstacles is how to supply the huge (needed) quantities of fertilizer pesticides. The recent imported quantities cost 100 US$ mio. (60 & 40 respectively).

Sudan being classified among the least developed countries is really in confrontation with difficulties and hence should be shared in its challenge.

** **GENERALS ON SUDAN**

POPULATION	25 MILLION
GDP PER CAPITA	$US 380
CONTRIBUTION OF AGRICULTURE TO GDP	33%
ACTIVE POPULATION IN AGRICULTURE	60%

** **FERTILIZERS**

- Two common types of fertilizers are imported, namely Urea and Trisuper-phosphate (TSP) foliar is also recently introduced (NKP)
- Quantities imported are about:

  UREA = 180,000 MT/A
  TSP = 20,000 MT/A

- Sixty million US Dollars is needed
- 2/3 of the above quantities are used in GB Scheme (biggest irrigated scheme in Africa) and remainder for other schemes.
- TSP usage is limited to wheat only though seriously needed for other crops.
- For TSP production many contacts have been with Tunisia but stopped earlier.
- From the side of Ministry of Industry many trials made in the mid seventies to produce fertilizers locally and a big plant was erected and installed but not started due to lack of raw material (Naphtha). The mislocation of the plant is also a constraint.

  So, although industry in Sudan is Agrochemical Industry still it depends totally on importation of fertilizer and pesticides.

Agricultural Profile: (in 1000 ha)

Field Crops:		17,230
of which	Cereals	8000
	Sorghum	5000
	Millet	1500
	Wheat	370
	Groundnut	500
	Sesame	1400
	Sugar Cane	0080
	Cotton	0450

in addition to sunflower and Guar.

All the field crops are also export crops

_____: Potatoes, Tomatoes, Onions, Garlic, Pepper and Galea (Sweat melon)

Export Fruit (Tree Crops): Mangoes (12 types), citruses, Lemon, Orange, Grapes, Guavas, Dates, Banana and Mandarines together with GUM ARABIC as a tree crop.

Pesticides Supply:

* 5000 mT/a
* $ 40 million US

No. of Pesticides registered: more than 100

No. of active ingredients: about 150

No. of companies registered as suppliers: 26

IPM: Implemented about 5 years ago as a collaboration between U of K and Agricultural Research Corporation.
Mainly to remove illiteracy of farmers towards using Pesticides safety and to economize the usage also.

WHO ARE INVOLVED

* Ministry of Industry
* Ministry of Health(Domestic)
* Ministry of Agricultural (U of K), Farmers Bank & GB Scheme
* GTZ (Now quitted)

Country Paper

SYRIA

SYRIAN ARAB REPUBLIC
Ministry of Agriculture and Agrarian Reform
Ministry of Industry

SYRIAN paper for the AFRO-ARAB Network meeting for risk reduction in the development of Agrochemicals held in:

Mauritius December 4-6th, 1996

Dr. Khalil Abdul Halim

Mohamed Ali Al Hussen

Introduction:

The growing demand for food supply called nowadays "food security" in addition to protect the mankind from different diseases which endanger life, were always creating awareness to farmers and to concerned people in the agriculture and social development and also in the level of decision makers.

During the half of this century, the success achieved by the discovery of insecticide properties for some of the agrochemicals was considered as a hope to reach the food security target and the required health safety.

Afterwards, developments in the field of pesticide and other agrochemicals been observed, however and because of the success achieved in crops protection against pests and insects causing disease, these chemicals were widely used as the only mean to control pests, therefore man thought that for reaching an increase in yield per land unit he can use any of agrochemicals at any quantity ignoring the environmental balance and also the cost paid by the environment for such mankind behaviour and it's impacts on the natural resources and also to health and safety, whereas health and safety of mankind should always been considered as the main target of the sustainable development to ensure the welfare and prosperity of mankind on the earth and to protect the natural resources for the second generation.

Impact of agrochemicals on social and agriculture development

After the mid of this decade, a great concern on food security to meet the ever growing population and due to the limitation of the natural resources it became very essential to:

1. - Increase the yield per unit area.
2. - Reduce the protection cost.
3. - Reach to a reasonable utilization of natural resources.
4. - Improve the health standards.

Therefore and to meet the above 4 targets, the mankind started to depend extensively on pesticides and various agrochemicals including fertilizers with thinking of other alternatives safer for mankind and environment.

However, and after long going on this one way road without any consideration to environmental issues, endangering the natural resources.

As far as efficiency of agrochemicals are concerned, some of the products loose their efficiency due to immunity generated on some insects and other agent's causing diseases.

Meantime, all have agreed on the negative effects of pesticides and other agrochemicals, therefore keen interests and concentrated efforts started by international organization toward reduction of negative effects caused by agrochemicals, and then to views and methods of working and control have been changed and new approaches started to replace the old techniques.

In front of the danger caused by agrochemicals to the environment, the concerned international organization started to put plans, working actions programmes and research to treat the negative effects resulted from the extensive and unplanned use of pesticides and also draw the attention of countries to the necessity of working in the right direction. Policies and new working plans have been established in accordance with environmental standards and sustainable development concepts, while keen efforts concentrated on:

1. - Develop the research institution to solve the associated problems and study of the alternatives.

2. - Recommend the types of pesticides and the agrochemicals.

3. Integrated Pest Management (IPM) and develop new alternatives to chemical pesticides.

4. - Proper utilization of pesticides, other agrochemicals and fertilizers in addition to increase the awareness on safety regulations and instruction of proper use.

5. - Proper use of fertilizers.

6. - Ease circulation of latest information and developments on pesticide use and different aspects of crops protection.

7. - Quality control on the pesticide production, use and on the degradation of chemicals in nature and also to accumulation of such compounds in food chain.

The present situation of agriculture, pesticides and fertilizer situation in Syrian Arab Republic:

SYRIAN agriculture is characterized by it's different crops production including strategic crops like cereals and food legumes, in addition to other farming products which also considered important such as (olive trees, fruit stones, pomme fruit, grape vine, citrus fruit, pistachios ...etc.) and also vegetables from both opened and covered farms like (cucumber, tomatoes, chilies, beans, okra ...etc.) and also industrial agro products like cotton, sugarbeets, sunflower, soya beans ...etc.

Within the recent years, the agricultural sector in SYRIA witnessed good progress, as the production figures of most products have been doubled for many times.

Such jump in agriculture production can be attributed to the implementation of various agrochemicals and also to other contributing reasons.

SYRIA also is one of the fertilizer producers in the Arab region, and there is an ambitious plan to increase production figures of fertilizers by adding new capacities.

Fertilizers use in SYRIA within the frame of agricultural development and agricultural intensification plans.

Meantime, and through good cooperation with the concerned international organization, SYRIA started seriously in reducing the risk of pesticides and reducing the used amounts as well, and that was achieved by:

1. - New regulations and decrees regarding the importation of pesticides and agrochemicals, also it's registration and handling it in SYRIA.

2. - Decrees and regulations relevant to the distribution and use of pesticides in SYRIA, by allowing the concerned technical personnel on their sites to act necessarily and make decisions according to the case.

3. - Agricultural media activities for the safety procedures of using the agrochemicals and draw attention to the hazardous resulted from improper use.

4. - Developments in the agricultural research institutions and carry out the studies and research on ecological and biological for disease and biological enemies, in addition to scheduling the time of spray of the chemicals to ensure the most safest way for both environment and biological enemies.

5. - Setting up the foundations for applied research in biological and microbiological control as one of the important elements in IPM.

6. - Development of research on soil and it's classification, and also the use of fertilizers in accordance with the soil test to decide the fertilization demand.

And as a good result of the above measures, a considerable reduction in pesticides and other agrochemicals has been achieved (as listed in the evaluation report), provided that more than 60% of the used pesticides are herbicides used in the cereal farms, also winter and summer spray oil.

For example, SYRIA and since many years, has started the biological and microbiological control in forests and citrus fruits; in some crops, a considerable reduction in pesticide use to the minimum has been achieved like in the case of cotton and olive.

Present problems and future tasks:

1. What has been achieved is still little and has not yet reached the stage of sustainability, and therefore it is considered very essential to develop the research in the field of integrated control specially the biological and microbiological control and forecasting and advising system for crop disease to reduce the demand and consumption of pesticides.

2. To develop the ways of partial control like seed dressing, partial treatment and sex pheromones ... etc.

3. Biological recovery of soil fertility.

4. Tracing the compounds resulting from the degradation of pesticides, fertilizers and other agrochemicals in the environment (soil-water).

5. Proper monitoring of residues in food chains and environment to ensure safety.

6. Research and studies about toxicological standards and toxicological evaluation of the pesticides as well as evaluation of its environmental and adverse health effects.

7. Quality control and assistance in implementing the health conditions, standards and the international requirements in chemical industries.

Comments on the recommended regional project

The recommended regional project dealt with very important issues, but it would not be possible for individual country to meet this challenge for many financial and technical reasons and the difficulties in covering various topics.

The real progress in facing such important issues will be through establishing regional programmes and faith cooperation between the countries of region, and support by the international organization.

The recommended working points cover most aspects considered hazardous, and could be categorized in the 3 following guidelines:

. - The use of pesticides and other agrochemicals and reduction in use, concentrating efforts on the development of new alternatives toward reaching the required safety and ensure the environmental balance.

. - Production, trading and handling of pesticides and agrochemicals in addition to circulation of regulations and standards relevant to insecticides, pesticides and other agrochemicals together with the production procedures as well.

. - Toxicological studies and specifications of hazardous products, and it's decomposition and chemical composition changes in the environment, and also the nature of relevant reactions with soil, water and air, also standardization of safe food and environment too.

We in SYRIA, highly appreciate and enhance the idea of the recommended project, and are well prepared for full cooperation, but will concentrate on the first guideline point in an attempt to reduce the risk of pesticide and agrochemicals, confirming also our readiness to host the network relevant to:

- Integrated pest management (IPM)
- developing plants pesticides and insecticide
- techniques in seed dressing

and can put, under the disposal of the project the required equipped labs and all available facilities in the plant protection department in the directorate of agricultural research institute, and are looking forward to participation in the other networks and would appreciate technical supports provided by international organization in contribution to risk reduction of pesticides and other agrochemicals.

We already started our efforts and formed the national working team to ensure better coordination between the concerned ministries in SYRIA (MOH, MOA, MOI and MOE), as a first step prior project start-up.

However and to ensure the active and effective continuation of the recommended project to achieve the required targets, we emphasize on giving the project a preparation stage between 6-12 months in which following arrangements can take place:

1. - nomination of the national technical teams in different networks.

2. - define the necessary equipment needed.

. - carry out the proper training to upgrade the qualifications of the technical team, each in his own field to ensure the execution of the tasks and provide the necessary equipment to make the network active.

Country Paper

TANZANIA

RISK REDUCTION IN THE DEVELOPMENT OF AGROCHEMICALS IN THE AFRO-ARAB REGION

Tanzania Country Paper
by

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SUMMARY

Tanzania, with a population of 27 million people and 95 million ha. of land, imports about 4000 tonnes and 593,000 lts. of pesticides per year. About 85% of these are imported and mainly used in the agricultural sector.

Efforts made so far towards risk reduction include an established registration scheme, reduced importation of pesticides and reduced problems of unwanted pesticides. Existing major problems include prior enforcement of the pesticide law, limited use of protective gear, improper disposal of empty containers and obsolete stocks of pesticides as well as misuse of pesticides.

Existing national institutions like Tropical Pesticides Research Institute (TPRI) and Tanzania Industrial Research and Development Organization (TIRDO) have adequate infrastructure equipment and manpower to participate in the Network.

1. INTRODUCTION

The United Republic of Tanzania with a population of 27 million and total land area of about 95 million habitants, lies on the East African coast. Agriculture which accounts for more than 60% of export earnings is the backbone of the economy. Leading export crops include coffee, cotton and cashewnuts. Food crops include maize, sorghum, cassava and rice.

2. USE OF AGROCHEMICALS

2.1 Fertilizers - mostly used in commercial crops like coffee, cotton, cashewnuts, tea, maize, rice and wheat. All fertilizers are now imported after the closure of the Tanga Fertilizer Plant. Phosphates which are locally mined and processed at Minjingu Plant in Arusha Region, are presently being developed for commercial use as fertilizers.

2.2 Pesticides - mostly imported and used in Agriculture. Only 10-15% are used in public health, animal health and the industrial sector. About 15% of total pesticides consumed are produced locally in one manufacturing plant in Moshi, and also in other 10 privately owned formulation plants located in Dar es Salaam (5), Morogoro (2), Tanga (2) and Moshi (1).

3. EFFORTS MADE TOWARDS RISK REDUCTION

3.1 Registration scheme - based on Pesticide legislation of 1979 and Pesticide Regulations of 1984. The Tropical Pesticides Research Institute (TPRI) under the Ministry of Agriculture was vested with the mandate to implement the scheme.

ACHIEVEMENTS:-

Pesticide quality assurance is now in place. 331 pesticides are now registered (Table 1).
Registration requirements include proper labelling as well as laboratory confirmatory tests and biological efficacy tests.

The 'FAO International Code of Conduct" on the distribution and use of Pesticides, has been adopted.

Training courses on 'Pesticides Legislation, Handling and Use" have been conducted for agricultural extension staff and technicians involved in pesticide business.

Reduction of number and volume of pesticides imported as well as banning highly toxic pesticides like parathion and Aldicarb. A number of organochlorine pesticides such as DDT, Dieldrin and Aldrin have either been banned or restricted.

Research results from monitoring of pesticide health hazards and residue analysis in foods, animal products and environment, have resulted into withdrawal of some pesticides from effected areas.

Reduced importation of pesticides - resulting from privatisation of importation and distribution business, increased cost of pesticides and adoption of IPM strategy.

3.3 **Problems of unwanted pesticides are now being addressed**

- In Zanzibar, all obsolete stocks (mainly expired DDT and malathion) have been taken to Britain for incineration
- Some unwanted pesticides in the mainland have been incinerated in cement kilns.
- Exhaustive inventory of pesticides and environmental hazards is now being undertaken by the National Environmental Management Council (NEMC) Tanzania Industrial Research and Development Organisation (TIRDO) and TPRI.

4. NEGATIVE FACTORS IN RISK REDUCTION

4.1 **Poor enforcement of pesticide law, due to** :

- shortage of inspectors
- weakness in the pesticide law, especially on prosecution and punishment of offenders.

4.2 **Limited use of protective clothing due to** :-

- unavailability in some areas
- high cost
- discomfort when using these in hot humid areas
- ignorance regarding risks involved.

4.3 Empty containers - usually not destroyed and some are used for domestic purposes

4.4 Lack of proper facilities for safe disposal of obsolete stocks of pesticides.

4.5 Misuse of pesticides - accidentally or intentionally (suicide).

4.6 Preference for powder formulations - even in situations where there is no protective gear.

5. ENVISAGED ROLE OF TANZANIA INSTITUTIONS IN THE NETWORK

TANZANIA will be in a position to play a significant role in the Afro-Arab Network on risk reduction in the production and use of agrochemicals. TPRI is a multidisciplinary institution which was formerly under the former E. African Community. It is now under the Ministry of Agriculture and has a workforce of about 200 people, 22% of whom are scientific staff.

5.1 Main activities

- Applied research - in all fundamental aspects of pesticides application and behaviour in relation to the control of tropical pests of agricultural and public health importance

- Technical services - in the areas of pesticides quality control, plant quarantine, herbarium and plant genetic resources.

5.2 Basis for involvement in the Project as a Technical Coordination Unit

TPRI and TIRDO may serve as Technical Coordination Units in the proposed project since they have available infrastructure and facilities as well as skilled manpower and database (Table 2). TPRI can serve in the following areas (arranged in order of priority):-

i) Quality control and quality assurance.

TPRI has 18 years experience in this area and has often offered consultancy services to various parts of Africa, including Ethiopia and Gambia. There are large laboratories for quality control and residue analysis which are presently under utilised since they were originally designed to serve the three East African countries.

ii) Information collection and dissemination.

There is good database on pesticide position for Tanzania. Training facilities are available, and various courses on pesticides have attracted local and foreign participants. TPRI has also hosted various international workshops on disease vector control and resistance monitoring in collaboration with UNICEF and WHO.

iii) Seed dressing technology.

In collaboration with local and other institutions within the COMESA region, TPRI has successfully concluded a UNIDO sponsored project on the development of seed dressing technology and post harvest treatment. The experience gained during the implementation of this project, as well as the existing collaboration with the Moshi Pesticides manufacturing Plant, can form a good basis for effective participation in appropriate regional projects.

iv) Application technology.

TPRI has over 50 years experience in the assessment of ground and aerial spray equipment. In a recent FAO Workshop held at Arusha (7-12 Dec. 1992) TPRI was recommended as an institution which could be assigned the responsibility of carrying out routing checking of performance standards for pesticide application equipment.

v) Botanical pesticide development.

TPRI in collaboration with international institutions in Finland, Germany and Kenya, has participated in the development of botanical pesticides and natural products for the control of stored product pests, ticks, tsetse, mosquitoes and schistosomiasis host snails. This collaboration can be extended to other countries within the Afro-Arab region.

vi) Occupational health and safety

TPRI has just concluded a five years IDRC sponsored African pesticide network project on the "Monitoring of health hazards and pesticide residue levels in people" involved in agricultural pesticide application. Urine and blood samples collected from Kenya, Uganda and Tanzania were analysed at TPRI laboratories. As a follow up to this project, there are now plans to set up a poison Information Centre which can also link up with countries within the Afro - Arab network.

TANZANIA INDUSTRIAL RESEARCH AND DEVELOPMENT ORGANIZATION (TIRDO)

1. BACKGROUND

TIRDO is a parastatal under the Ministry of Industries and Trade which was established by the Parliamentary Act No. 5 of 1979 and became operational in April 1979. It has a workforce of about 100 people, 40% of these are technical staff.

2. MAIN ACTIVITIES

2.1 Applied Research - The mandate of TIRDO is mainly to carry out industrial research for the purposes of developing products and processes suitable for the Tanzania industrial environment. The emphasis is to promote the use of indigenous raw materials which can be processed using equipment fabricated largely by local workshops.

2.2 TECHNICAL SERVICES TO INDUSTRY

TIRDO also offers a number of services to industry such as repair and maintenance of various instruments, chemical analysis, energy management, industrial information, material testing, machining, welding and fabrication and other advisory services on trouble shooting activities and environmental problems.

3. BASIS FOR INVOLVEMENT IN THE NETWORK

TIRDO can serve in the following areas:

3.1 INDUSTRIAL SAFETY AND WASTE MANAGEMENT

TIRDO is the host of the National Cleaner Production Centre which was established in 1995 with support from UNIDO and UNEP. The main objective of the Centre is to promote the Cleaner Production concept in the country through information dissemination, training, demonstration and by providing policy advice to key policy makers in the country to enable the promotion of cleaner production. The issue of industrial safety, pollution prevention and waste management is being addressed by the Centre in its programme. The Centre enjoys a collection of a number of documents on environmental problems and solutions and will soon be linked to internet.

3.2 OCCUPATIONAL HEALTH AND SAFETY (OHS)

Awareness and advice on OHS of employees in industries is being addressed by the Cleaner Production Centre in collaboration with the Factory Inspectorate. Cleaner production emphasises elimination or reduction of toxic materials in processes and protection of health hazards to humans.

3.3 FORMULATION TECHNOLOGY

TIRDO with 17 years experience in applied research has this capacity. A number of technologies using indigenous raw materials have been developed at TIRDO such as production of caustic soda from transformation of chalk from local gypsum, production of turtural from bagasse and many others. Plans are underway to formulate fertilizers from the locally available phosphate from Minjingu mines.

3.4 APPLICATION TECHNOLOGY

Mechanical workshop at TIRDO has the capacity to make appropriate spray equipment and accessories.

3.5 FACILITIES

TIRDO has experience staff in the field of engineering, industrial technology, environmental pollution prevention and information. The laboratories and workshops are equipped with the necessary scientific instruments and equipment. Offices and communication facilities are available.

Table 1. Pesticides registered in Tanzania, 1996

	REGISTRATION CATEGORY				
Types of pesticides	Full	Provision	Restricted	Experimental	TOTAL
Insecticides	5	68	14	77	164
Fungicides	3	26	1	40	70
Herbicides	2	34	-	28	64
Acaricide	-	3	7	7	17
Nematocides	-	2	1	5	8
Rodenticide	-	-	-	4	4
Avicides	-	2	-	-	2
Growth Regulators	1	-	-	1	2
Total	11	135	23	162	331

Table 2. **Country facilities and other contributions available for project implementation**

Institutions	Focal points	Available contribution	Requirements
TPRI	- Quality control and assurance - Information collection and dissemination - Seed dressing technology - Botanical pesticide development - Occupational health and safety	1. Database-pesticide registration, laws, residue monitoring 2. Established training programme and appropriate facilities 4. Infrastructure 5. Trained and experienced manpower 6. Ongoing pesticide research	1. Operational costs 2. Improved communication system 3. Computers 4. Fellowships
TIRDO	- industrial safety and waste management - Formulation technology - Application technology	1. Infrastructure 2. Laboratory facilities 3. Experienced manpower	1. Equipment 2. Fellowships 3. Operational 4. Relevant experts

Country Report

TUNISIA

(Presented by Abedlaziz Chebil)

INTRODUCTION :

The world's demographic growth, specially for the third world countries (and the increase in their food demand) constitutes one of the major danger for the humanity when we consider the limited food resources available or being available .

Trying to reach an equilibrium, man has recorded an important increase in the matter of education, health and is now able to maintain the borning rates and though the demographic growth. However, in the matter of increasing the availability of agricultural food resources and regardless to his ability to develop several techniques to control and increase the crop's productivity it is still difficult to control the crop diseases which constitutes the major constraints du to the variability of diseases such as insects, fungus, viruses, bacteria's, weeds and nematodes.

Moreover, as far as the farmers are trying to increase the productivity of their crops (advanced irrigation techniques, fertilizers, new varieties etc...) plants become more subject to diseases. At this point farmers now are more interested to solve these problems and I believe that the increase in the availability of food resources is dependent on how the farmers try to protect their crops along their growth stages. In this order many examples are to be considered:

- According to FAO statistics, one third of the world's crop production is lost due to the above mentioned problems and it may increase to reach about 60% in the third world countries.

- The study conducted by the International Nuclear Agency and the FAO showed that the total crop loss in North Africa countries due to the fruit fly, only is as follow:

  - Tunisia : 1.435,514 US dollars
  - Morocco : 9.229.054 US dollars
  - Algeria : 5.567.279 US dollars
  - Libya : 1.484.319 US dollars

2/ National Pesticides Legislation and Regulations:

Plant control is regulated in the country by the law No. 72 of the year 1992 dated 3rd August 1992 which stresses the major changes in the plant control legislation taking in account the quarantine, pesticides industry, importation, commercialisation and distribution.

In addition, this legislation is now changed and newly established by the Ministry of Agriculture to avoid such mistakes encountered in the old legislation and to follow the advanced technology and findings in this matter .

Also, in 28 December of 1992 a law No 2246 was stated to define the criteria to subscribe pesticides for agricultural use and conditions to produce, import and distribute such products.

The legislation of pesticides in Tunisia is established according exclusively to the principles of the FAO code. Thus, the legislation now is as follows :

- Control authority : The Ministry of Agriculture.
  Special restrictions for the extreme toxic and gazeous pesticides and which are extremely dangerous during their handling.
  Control institutions : " Laboratoire de control et d'analyse des pesticides ", Ministry of Agriculture, this laboratory is well equipped and the main and major items are :

  * 8 GLC with 16 detector gathered
  * 3 HPLC
  * 2 Spectrophotometer
  * 1 Infra-red

Also all main items to prepare samples for Physical, physicochemical and chemical quality control of pesticides are also controlled in this laboratory.

Penalties: They are clearly stated in the legislation and used when violation occurs.

3/ Pesticides used in Tunisia :

1/ A list of registered Products (joint).
2/ All pesticides are imported
3/ No export
4/ No local production of pesticides.

4/ Non-Government Organisation / Private Sector :

Up to now, the NGO's are not involved in the matter of pesticides. However private sector is fully involved in the importation of pesticides once they are authorized by the Government (Ministry of Agriculture).

5/ Information system (s) on Pesticides in Tunisia :

The only source or system of information available in the Country is through the Ministry of Agriculture. This information though is provided free to the importers.

Information requested from other countries or institutions are obtained according to our demand and no such automatic system to receive or exchange information exist.

6/ Institution of the Code of Conduct and PIC:

The National authority (DNA) for the PIC in Tunisia is now among the Ministry of Agriculture through the national laboratory of control and analysis of herbicides. One of the difficulty related to PIC is that information is not well exchanged and/or received properly between the different partners in this field.

7/ Expectation from the workshop:

1/ Establishment of an appropriate and adequate legislation specific to each country.

2/ Establishment of a regional program of training sessions for technicians within the participant countries.

3/ Exchange and collaboration between participant countries in the matter of quality control and analysis of pesticides which are either imported or manufactured locally. This collaboration should also consider the residual analysis of all pesticides.

4/ Exchange of expertise and information related to pesticides.

Table: PESTICIDES IMPORTED (1990-1994)

PESTICIDES	1990		1991		1992		1993		1994	
	Q	V	Q	V	Q	V	Q	V	Q	V
80) 3000	850	3200	600	2500	550	2200	650	2600	700	
50) 2250	650	1900	750	2100	650	2000	750	2200	700	
60) 4000	400	3000	400	3000	450	3100	550	3900	500	
20) 750	90	600	110	700	80	650	95	700	100	
210) 10000	**1990**	**8700**	**1860**	**8300**	**1730**	**7950**	**2045**	**9400**	**2000**	

( ) : Ingredients Actives
Q : Tonnes or 1000 litres
V : Tunisian Dinars (1000 TND)

Country Report

UGANDA

RISK REDUCTION IN THE DEVELOPMENT OF AGROCHEMICALS IN UGANDA

There is no manufacture or formulation of agrochemicals in Uganda. The importation, handling and application of agrochemicals constitute a major issue in the country because they are used extensively in agricultural production, livestock and human health protection. A wide variety of agrochemicals are used to improve the quality and quantity of crops and Livestock. Most of this used is carried out by small land owners who apply simple traditional methods and are ill equipped for proper application of the chemicals. Correspondingly a wide variety of hazards are posed to public health and the environment. The importation and use of agrochemicals is on the increase.

AGROCHEMICALS USAGE

Agrochemicals are used in a variety of ways in Uganda. Different chemicals are often used for the same purpose.

Crop Protection

Crops like cotton, coffee, green bananas and horticultural crops require heavy and regular use of agrochemicals at most stages of production. Even the traditional crops like beans, maize, groundnuts, cassava and potatoes experience pesticide use. Table 1 shows the commonly used pesticides in Uganda.

Livestock Protection

Livestock protection against ticks involves heavy and regular use of pesticides. In the past this protection was dominated by organochlorines (toxaphene and lindane) but these have given way to organophosphates (Delnavand Supona) and cypermethrin (Tendona). These chemicals are mainly used in cattle dips which are usually drained into the natural drainage system without any treatment. This poses a threat to the water bodies and the good chain. In addition the method sand skills employed in mixing pesticides into the dips and emptying them are manual in nature. The people and workers who normally carry out this exercise are not provided with protective gear, consequently illhealth is rampant among such workers.

Vector Control / Public Health

Common vectors responsible for spreading diseases to humans include mosquitoes, tsetseflies, blackflies, mosquitoes. A variety of pesticides is used to control the spread of the vectors DDT, Dieldrin and Thiodan have been used in the past. They resulted into large stocks of the pesticides in the country. Their storage and disposal is an issue as there are not appropriate incineration facilities. Currently two pesticides, deltamethrin and alpha cypermethrin are on trial to replace the more persistent ones.

Mixtures of DDVP and permethrin in pressurized cans are applied for domestic control of insects. Diazinon is widely used domestically to control bed bugs. This has caused many deaths among children through accidental ingestion and among adults by facilitating suicides.

Molluscides and larvicides are applied on water so as to control the vector snails and that blackfly that transmit schistosomiasis and river blindness respectively. Application of these chemicals contributes a significant load of toxic chemicals to the water bodies.

Locust/Army Worm Control

Desert locusts which cross into Uganda are often controlled by Thiodan. Decamethrin (Decis) is on trial to replace Thiodan. The same pesticides are used to control the armyworm that affect crops from time to time.

Weed Control

Herbicides are widely used on large plantations of tea, sugarcane, coffee and bananas. The common ones are 2,4-D, 2,4,5-T, Gramoxone and glyphosate. Dalapon and atrazine are also in use.

Seed Dressing

Seeds are dressed prior to planting so as to protect them against fungicidal and insecticidal attacks. Heptachlor or dieldrin mixed with phenyl mercuric acetate is used for beans, maize and groundnuts. Lindane is widely used. Wheat take only mercuric acetate. Dressed seeds have been a major cause of death from acute poisoning arising from accidental ingestion.

Forestry

In the past dieldrin was the main pesticide used for control of termites. Currently a variety of pesticides are used in different activities within the forestry sector. These include carbosulfan, carbofuran, and sumithion.

PROBLEMS

Agrochemicals are misused in many ways. Aside from use with suicidal intentions there are various ways of misapplication A few examples are given:

- Fishermen use pesticides to catch fish.
- In rice growing areas bird pests are killed with pesticides.
- Killing lice in the hair of persons.
- Treating of wounds and skin diseases.
- Using empty containers as utensils and this has resulted in deaths among families.

Many of the pesticides that have been used intensively over long periods in Uganda are organochlorines and these that grew prohibited and/or severely restricted in the countries of origin.

These are well known for their persistence and accumulation in the environment, apart from their inherent toxicological behaviours. But no monitoring of the residues in food and drink has been done, neither have residue levels been monitored in soil and water.

There is wide usage of agrochemicals in Uganda. Pesticides are the most easily accessible toxic chemical and most widely stocked in farmers' houses in rural areas. The quantities involved are large as can be seen from the annual import bill. For 1989/90 this was 25 million US Dollars and 1.325MT, 1.660MT for 1990/91 and 2.224MT for 1991/92.

The majority of the users are peasants who are illiterate, ill equipped, unprepared and unprotected, obsolete equipment is used for application.

Acute effects alone have been responsible for over 272,000 cases of poisoning in Uganda annually. One percent of these cases are fatal. Chronic cases are often missed as diagnostic facilities are lacking. Reporting of cases is also poor.

Many plants depend on insects for pollination. Widespread and injudicious use of pesticides therefore reduces insects ability to effect pollination and therefore impairs reproduction among plants.

Agrochemicals adversely affect populations of organisms which serve as food for economic species (e.g. fish). As chemicals are applied on plants and on the land, they are washed down into water bodies. The presence of chemicals in water systems affects populations of aquatic insects, crustaceans and other invertebrates that form an important source of food for fish and birds.

Large stocks of expired chemicals and/or toxic chemicals which are prohibited or severely restricted in their countries of origin are stored in various places in the country since there are no proper chemicals waste disposal facilities.

The extent of agrochemicals effects and damage on public health and the environment is not known. Agrochemicals usage has taken place without corresponding measures in place to ensure the safe use of such toxic chemicals.

MEASURES IN PLACE

The Agricultural Chemists Statute of 1989 enabled the creating of the Pesticides Control Board to ensure safe use of Agricultural Chemicals. This law is implemented by the Ministry of Agriculture and is strictly crop protective and inadequate in areas like storage, transportation and waste disposal.

The PIC procedure which is being implemented by the Ministry of Agriculture although it is not very effective.

The Uganda Revenue Authority is charged with the responsibility of ensuring that toxic chemicals are not allowed in the country at the customs or point of entry. A list of chemistry not to be imported into the country is provided to Uganda Revenue Authority personnel at the points of entry.

The National Environment Statute of 1995 provides for the establishment of criteria for the classification of toxic and hazardous chemicals and materials in accordance with their toxicity and the hazards they present to human health and to the Environment. It also provides for establishment of guidelines and measures for the management of toxic and hazardous chemicals and materials.

The National Environment Statute of 1995 provided for the establishment of the National Environment Management Authority which is the principal agency in Uganda for the management of the environment. It co-ordinates, monitors and supervises all activities in the field of the environment. The National Environment Management Authority has established Environment Liaison units in sectoral agencies (Line Ministries, Government agencies, Private sector) to facilitate horizontal integration of environmental concerns in sectoral planning and activities.

CONTRIBUTION TOWARDS NETWORK

The National Environment Management Authority mandate has already been described. It will be the National Coordination Unit and will provide the National Network Coordinator.

The Uganda National Bureau of Standards under the Ministry of Trade and Industry is charged with the responsibility of setting standards for consumer goods. It needs to be strengthened and equipped so that it can carry out analysis of pesticide residues in food and water.

The National Agricultural Research Organisation represents the public sector agricultural research system in Uganda. It controls eight institutes which hold various research mandates. These institutions will contribute to the network through their different activities and mandates.

Qualified personnel exist in different institutions of Government.

Other possible focal points will include information collection and dissemination, IPM concepts, Industrial Safety and Waste Management, and Ecotoxicology and Environmental Monitoring.

Table 1: Commonly used pesticides in Uganda

Group	Name Example
	Malathion, DDVP, Diazinon, Methyl-parathion, Dursban, Phosdrin, Fenitrothion, Dimethoate (Rogor), Bromophos, Dichlorvos
ORGANOCHLORINES	DDT, Aldrin, Dieldrin, Lindane, BHC, Thiodan, Toxaphene
CARBAMATES	Dithane M45, Dithane M44, Dithane M22, Furadan
PYRETHRINs/PYRETHROIDS	Ambush CH (permethrin), Ripcord (cypermethrin)
BIPYRIDYLS	Grammoxone (Paraquat),Weedol, Diquat
PHENOXY ACETIC ACID	2, 4 - D, 2,4,5 - T, MCPA
INORGANIC METAL	Shell Copper (copper oxide), Lead Arsenate, phenylmercuric Acetate, Arsenic trioxide.

2,4 - D	=	Dichlorophenoxy acetic acid
2,4,5 - T	=	Tricholorophenoxy acetic acid
BHC	=	Benzene Hers Chloride
DDT	=	Dichloro Diphenyl Trichloroenthane
DDVP	=	Dichloro Diphenyl vinyl Phosphate (vapona)
MCPA	=	Monochlorophenoxy acetic acid

Country Paper

ZAMBIA

AFRO-ARAB WORKSHOP ON RISK REDUCTION IN AGROCHEMICAL DEVELOPMENT MAURITIUS: 4-6 DECEMBER 1996

AGROCHEMICAL USE: THE ZAMBIAN PERSPECTIVE

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1.0 GENERAL INFORMATION ON ZAMBIA

1.1 Geography and Climate

Zambia is a landlocked country in Southern Africa, lying between 8° and 18° south of the equator and bordered by Zaire, Tanzania, Malawi, Mozambique, Zimbabwe, Botswana, Namibia and Angola. It has a surface area of 752,972 km² most of which forms a plateau lying between 1,000 and 1,600 meters above sea level. The highest parts of the country are in north east, with the plateau gradually sloping to the South West.

The temperatures range from 16° C to 38° C in the hot and wet season. The country's main drainage systems are the Zambezi River system whose major tributaries are the Kabompo, Kafue and Luangwa rivers and the Chambeshi watershed. These rivers together with several large lakes, provide Zambia 's most important water, fisheries and tourism resources. In addition to Lakes Mweru, Bangweulu and Kariba in the South. Zambia's territory encompasses part of lake Tanganyika in the North. Near Livingstone, The Zambezi river passes over world famous Victoria Falls (over which during floods, fall five million litres of water per second).

The Zambian population is about 9 million

1.2 Agriculture

Zambia's agriculture is characterised by a distinct contrast between commercial and subsistence farming; the large scale commercial farms are concentrated along the line of rail, subsistence farming is distributed throughout the country. The national agricultural campaign called 'LIMA programme' for increased agricultural production has turned a large proportion of subsistence farmers into a third category of 'emergent' farmers. The level of mechanisation is low and the use of drought power is just beginning. Farming in Zambia is predominantly rainfed (only 1% of the potential agricultural land is irrigated).

1.3 Industry

Until 1975, the manufacturing industry constituted Zambia's largest non mining economic sector, with an annual growth rate of 10% and contributing 11% to the GDP. Of late most industries operate below their capacities. Food stuffs, beverages and Tobacco form the largest subsector in terms of employment, investment and output, followed by textiles, sawmilling, manufacture of cement products, chemicals and pharmaceuticals. The bigger growth in manufacturing output has been in newer industries such as basic metals (71.1%), paper products (20.2%) and chemical, rubber and plastic products (15.3%). Generally the industry is consumer oriented. It produces more consumer goods than capital goods.

1.4 Development and Agriculture

Zambia depends on copper for 90% of its foreign exchange earnings. Since 1977 when the copper market collapsed the country's earnings have been going down. This has led the country to diversify the economic base. The country has now devoted its efforts to developing the natural resource base. Government development aims are strongly biased towards the development of agriculture, both in the large scale commercial sector and the traditional sector. Special attention is being given to the later with so many uncertainties.

In 1991 there was a major political change with the country changing from a one party state to plural politics. This brought about the change from a highly controlled and regulated economy to mostly a market economy. The agricultural sector has been liberalised as well. The Government of the Republic of Zambia has prepared a major document called 'Agricultural Sector Investment Program (ASIP) which provides a framework which will guide the agricultural sector as it moves from controlled to liberalised economy. The potential for agricultural production in Zambia is great but has not been realised. The reasons being (i) excessive government intervention and control of markets and (ii) inadequate provision of essential public services. Both situations must be corrected.

2.0 FERTILISER AND PESTICIDES POLLUTION

Use of fertiliser and pesticides lead to increased agricultural yield, especially vertically. However, improper use of agrochemicals in Zambia has had a negative effect on the environment.

2.1 Fertilisers

Nutrients deficiencies and imbalances have been appearing, particularly in commercial farms, over the years. Some heavily fertilised soils are actually experiencing declining yields, mainly because the heavy doses of fertilisers which were intended to increase production have actually acidified the soil.

The Kafue river which is Zambia's most important river industrially and agriculturally, is choked with the water hyacinth due to Eutrophication. One of the major contributing factors is the sugar plantation (Nakambala Sugar Estates) upstream where there is heavy use of fertilisers. Eutrophication have been felt in some areas which have reported mystic fish killings. During drought the vegetation that grows in the water bodies contribute to high water losses due to transpiration. Water hyacinth has led to reduced availability of water downstream the Kafue river which has led to reduced Hydro Electric Power (HEP) generation.

Table 1: Fertiliser Average annual amounts used (MTONS)

TYPE	AMOUNT (MTONS)
(a) NPK	225,000
(b) Acids	60,000
(c) D compounds	125,000
(d) X compounds	100,000
(e) R compounds	100,000
(f) V compounds	100,000
Total	**710,000**

2.2 Pesticides

Zambia is witnessing a steady increase in the importation and use of different types of pesticides both for agriculture and public health. In 1992, it was estimated that up to 200 pesticides types (by trade names) were being used in Zambia in excess of 1000 mt. By the end of 1993 the number of different pesticides (trade names) had reached almost 300.

Table 2: Pesticide Average annual amounts used (MTONS)

TYPE	AMOUNT (MTONS)
(a) Insecticides	600
(b) Herbicides	300
(c) Fungicides	70
(d) Acaricides	100
(e) Rodenticides	15
(f) Molluscicide	Data not available
(g) Plant growth Regulators	40
(h) Insect growth Regulators	Not available
(i) Bacteriocides	Data not available
TOTAL	**1,115 MTONS**

2.2.1 Pesticides use, safety and environmental impacts

Pesticides have had serious effects on health and environment in general. Due to lack of legislation for a long time different types of pesticides used have not been regulated. In some cases pesticides banned elsewhere in the world have been imported into the country

(ECZ/WWF, 1992) Lack of legislation compromised greatly the safety of workers involved in handling and use of pesticide resulting in human deaths (Chalabesa and Kaposhi, 1991).

Safety instructions are not well followed by both the manufacturing industry and the farmers with the latter worst affected. For manufacturing/formulating industries most of them have small buildings which are not well ventilated and/or lit. Most of the workers do not have adequate protective clothing and therefore risk their health. The smallscale farmers do not use protective clothing and few take good care of the clothes they use when spraying. Safety precautions are mostly not followed.

Meanwhile the Ministry of Labour and Social Security(MLSS) lacks information on accidents which have occurred due to pesticides poisoning.. The efforts of the Ministry are mostly directed towards industries/factories. Pesticides poisoning of workers on the farms is not well documented. However the Government through MLSS hopes to redress the situation when the "Occupational Safety and Health (OSH) Bill" s passed in 1997.

Serious environmental effects have been reported such as fish kills during large scale pest control programmes such as endosulfan use in tsetse control and more recently, bird and snake kills have been reported during aerial and ground locust control operations in South Western Zambia (ECZ Report, 1994). Approximately 340 mt of pesticides stock including DDT, dieldrin and other pesticides exist in different parts of the country with very high risk of polluting the ground and surface water bodies (FAO Country survey 1994).

With the liberalisation of the market, chemicals are sold freely along foodstuffs in large supermarkets, drugstores and the streets.

The biggest problem associated with pesticides use is not the quantities used but the low level of awareness of pesticide risks and dangers. The lack of awareness exists at all levels of the society.

3.0 PESTICIDES LEGISLATION

For a long time in Zambia there was no legislation on importation and use of pesticides although there were regulations on pesticides residues in food. The first major legislation was the Environmental Protection and Pollution Control Act (EPPCA) No 12 of 1990. This was followed by the Pesticides and Toxic Substances Regulations issued under S1 No 20 of 1994.

The enactment of the EPPCA lead the establishment of the Environmental Council of Zambia (ECZ) which is the sole Government institution responsible for environmental protection and pollution control. The EPPCA No 12 of 1990 -part V11 covers pesticides and toxic substances. Consequently, the ECZ has established a Pesticides and Toxic Substances (PTS) Unit which among other things is charged with the responsibility to control and monitor the Importation, Exportation, manufacture, packaging, labelling, warehousing, transportation, distribution, sale, use and disposal of Pesticides and Toxic Substances.

Registration

The implementation, enforcement and monitoring of the regulations has been progressing at a slow pace mainly due to institutional, financial and management constraints.

It took a long time for most organisations to either comply with the regulations or co-ordinate with the Environmental Council of Zambia (ECZ). The ECZ 's Pesticides and Toxic Substances Unit has limited financial and human resources to enforce the regulations.

The Environmental Council of Zambia is working hand in-hand with various Government organisations and institutions in registration of pesticides. This includes the Ministry of Agriculture, Food and Fisheries (MAFF), Ministry of Health (MOH), Ministry of Labour and Social Security (MLSS), Ministry of Environment and Natural Resources (MENR), University of Zambia (UNZA), Zambia Revenue Authority (ZRA), Zambia Agro-ChemicaIs Association (ZAA), Zambia National Farmers Union (ZNFU) etc.

Efforts have been made to harmonise the Registration of Pesticides in the Southern and Eastern African Region. The first regional registration harmonisation workshop took place from 5th to 6th February, 1996 in Lusaka, Zambia. A committee named the Southern and Eastern African Regulatory Committee on Harmonisation (SEARCH) was set up .The next meeting will tentatively be held in February next year to review progress made.

Integrated Pest Management (IPM)

So far there are no concerted programmes on Integrated Pest Management. Farmers learn about agrochemicals management from Agricultural Extension officers in a more or less implicit way, as one of the packages for increased agricultural production. However the level of awareness among farmers is very low. In order to enhance the IPM, there are some government departments undertaking in research in natural pesticides e.g. National Council for Scientific Research (NCSR). Private organisations like the Church (Roman Catholic Church) are involved in IPM research through at an insignificant scale.

Public awareness

Considering the low level of understanding of the risks associated with the use of agrochemicals, vigorous public awareness campaigns need to be undertaken in Zambia in collaboration with other institutions.

Collaboration with international organisations

The Environmental Council of Zambia, collaborates with various international organisations in executing its duties and responsibilities. These organisations include:

(i) United Nations Institute for Training and Research (UNITAR) currently involved in preparation of Zambia's Chemicals Management Profile.

(ii) Food and Agriculture Organisation (FAG) of the United Nations (UN). currently involved in Obsolete Pesticides disposal.

(iii) United Nations Industrial Development Organisation (UNIDO)

(iv) World Health Organisation (WHO)

(v) International Labour Organisation (ILO)

(vi) United Nations Environment Programme (UNEP)

(vii) International Programme on Chemical Safety (IPCS)

(viii)International Atomic Energy Agency (IAEA)

(ix) Common Market for East and Southern Africa (COMESA)

Advantages of risk reducing in agrochemicals development

The major advantages derived from risk reduction in agrochemicals development is the improvement safety of the workers in the agro-chemicals industry (e.g. farmers, households).

Appropriate risk reduction intervention measures would also help remove the danger of eutrophication due to the use of fertilisers.. This will therefore, provide a normal life in water and the surrounding community which depends on aquatic life.

Measures to be taken in reducing the agrochemicals risk:

- Use agrochemicals (pesticides) with low toxicity and in the form which is easy to handle .
- The companies disseminating the chemicals should invest in educating the public not only about the advantages but also effects of misuse of agrochemicals.
- There should be more coordination among institutions involved in agrochemicals use both at national and international level.
- Most developing countries should have legislation on agrochemical registration and monitor the use. Development of harmonised Legislations amongst developing countries in the use and registration of agrochemicals would go a long way in reducing risks and grouping of obsolete chemicals.
- Research on agrochemicals should be more integrated taking into account the obtaining socio-economic and ecological conditions.
- For Zambia, initiatives to address the issues of agrochemicals managed which need to be taken at local level are actively being pursued. The development of a National Chemical profile for Zambia is one such initiative.

With the EPPCA and the PTS Regulations in place, an enabling environment has been provided for a safe and effective agrochemicals management in the country. However, there is need for logistic support in terms of resources, to implement this.

Country paper

ZIMBABWE

AFRO-ARAB WORKSHOP ON RISK REDUCTION IN AGROCHEMICAL DEVELOPMENT MAURITIUS: 4-6 DECEMBER 1996

1. INTRODUCTION

The paper will cover the following in the given order:-

- pesticide registration requirements;
- data on pesticide accumulation;
- requirement for import and exports of pesticides;
- problems faced by industries in the subsector;
- formulation technologies for both fertilizer manufacture and pesticide manufacture
- Quality Assurance/Quality Control
- Waste management and environment monitoring
- biological and botanical pesticides development
- integrated pest management concepts (IPM)

2. PESTICIDE REGISTRATION REQUIREMENTS

2.1 EFFICACY DATA

Local research is done on the pest for three years using the pesticide to be registered. At the same time data is collected. The applicant who wishes to register the pesticide then submits to the Ministry of Agriculture the following:-

- efficacy data
- draft label for the pesticide

The data is then extensively evaluated by scientists and then it is passed on to the Hazardous Substances Board at the Ministry of Health for classification. At the Ministry of Agriculture, Plant protection and Research Institute , the substance is registered and given a registration certificate. The holder of the registration certificate is then allowed to import the pesticides into Zimbabwe.

2.2 TOXICITY DATA

The above is the data on toxicity level of the pesticide and it is provided by the applicant to the Ministries of Agriculture and Health specialists for classification. The data provided forms the basis for the classification of the product.

The Ministry of Health evaluates the toxicity data. In the case of acute toxicity they look for the following:

- the product's effect on the environment
- the product's effect on non-targeted species
- whether the product is biodegradable
- whether the product is registered outside Zimbabwe. This is to avoid the dumping of toxic products in the country.
- if the product being requested for registration is genuinely required, then the Ministry of Health specialists have to establish why the product is not registered in the country of origin.

2.3 DATA ON PESTICIDE ACCUMULATION

Application of some pesticides can lead to accumulation of some pesticide in the agricultural products or in the environment. To deal with this issue, the applicant provides analytical standards to the Department of Hazardous substances who send it to the Government Analytical Laboratory. However, the Department of Hazardous Substances in the Ministry of Health has no capacity to do routine monitoring in this area. Some routine monitoring is done by the City Health Departments working closely with the Government Analyst Laboratory. The City Health Department mainly monitors the accumulation of pesticide in the edible products.

To monitor the accumulation of the Hazardous products in the environmental computer models are needed for the simulation of the requisite conditions in the laboratory. At present this capability is not available in the department. What guides the specialists here is availability of international literature.

The United Nations has a 'dirty dozen: list of hazardous chemicals. This list consists of the main Group I hazardous chemicals which are highly restricted or banned, (the classification is done by a world body that deals with hazardous substances). When the list was formed the substances were a dozen.

In cases where there are no available alternatives some of the substances in the Group I category are still registered and used in Zimbabwe under controlled conditions with permission from the Ministry of Health.

2.4 REQUIREMENT FOR IMPORT AND EXPORT OF PESTICIDES

Registration of pesticides and other agrochemicals is a requirement/prerequisite for importation or exportation of the chemicals.

This means that the importer or exporter should be a registered company under the Companies Act, and should have a registration number and certificate for a specific product being imported or exported.

2.5 THE PROBLEMS FACED BY INDUSTRY IN THIS SECTOR

2.5.1 REGISTRATION

The Industry feels that there are delays in the registration of new products and in the extension of use for existing products at the Ministry of Agriculture. The Drug Control Council requires registration and retention fees to be paid in US dollars. This is a constraint to most applicants.

2.5.2 EXTENSION SERVICES

The industry feels that the Ministry of Agriculture's extension services (Agritex) is unable to sufficiently service farmers, particularly in the small scale sector, in the safe and correct use of agrochemicals.

2.5.3 CUSTOMS TARIFF ON IMPORTED RAW MATERIALS

Tariffs on raw materials are high and need to be rationalized so that inputs are charged low tariffs. High tariffs disadvantage the consumers who have to pay a higher price for the product. Alternatively they (consumers) may shift to a cheaper and probably less effective chemical.

2.5.4 RESEARCH AND DEVELOPMENT

At the moment research on agrochemicals is minimal and there is need to intensify it.

Research will also assist in developing the country's capacity in producing active ingredients needed for local formulation of agrochemicals.

3. FORMULATION TECHNOLOGIES

The major formulators of Agrochemicals in Zimbabwe are Agricural (Pvt) Ltd - for fungicides, insecticides and herbicides - and Zimbabwe Fertilizer Company - for fertilizers, Coopers (Pvt) Ltd and Zimphos for animal health products.

3.1 FERTILIZER FORMULATION

Companies in Zimbabwe formulate fertilizers according to Zimbabwe/South Africa standards. These companies, also formulate fertilizers to customer's specifications.

Some of the companies export to the region and they have to meet regional standards specifications.

Although most companies in the fertilizer business are into formulation, Sable Chemicals and Zimphos are into the production of the fine chemicals. Sables produces, amongst other things, Ammonium Nitrate while Zimphos produces phosphatic fertilizers and animal health products.

3.2 NEW DEVELOPMENTS IN FERTILIZER FORMULATION INDUSTRIES IN ZIMBABWE

Because of different types of soils that fertilizers have to be applied to, the formulation of blended fertilizers is on the increase. Fertilizers are normally blended to specifications given by the analysis done by agronomists on the soils requirements. Once the specification has been made it has to be registered with the Ministry of Agriculture. Blended fertilizers usually contain nitrates (N), phosphates (P) and Potassium(K) and hence they are called NPK fertilizers.

Due to the need for more blended fertilizers some companies in Zimbabwe have acquired granulation plants. The plants make granules in different batches each containing nitrates (N), Phosphates (P) and potassium (K). The different granules are then blended to different customer specifications. Blending granules is quicker for the case mentioned above and also for lower tonnage requirements.

One company in Zimbabwe which started blending this (1996) has a plant which can do 15 tonnes of blended NPK fertilizer every hour.

3.3 QUALITY ASSURANCE AND QUALITY CONTROL

When the different inputs are received they are sampled and tested to see if they comply with the requested specification. The composition of the granules are analyzed every hour to see if they comply with required specification.

A sieve analysis is done to make sure that the granules are the appropriate size.

Before dispatch packaging (bags) are tested for strength and stitching. The product is sampled and tested before dispatch.

The weighing machines calibrated using certified weights from the Department Trade Measures (in the Ministry of Industry and Commerce).

There is a company which has been accredited to the ISO 9000 series of standards by the Standards Association of Zimbabwe (SAZ). Other companies are working to get accreditation to both ISO 9000 and ISO 14000 series of standards on quality and environment respectively.

3.4 WASTE MANAGEMENT AND ENVIRONMENT MONITORING

Most companies have waste management programs. Dry waste is normally recycled. Wet waste is directed into sumps for settling down and only clean water is let into the municipality sewage system.

Some companies have dust monitoring systems in the factories. These ensure that workers operate in conducive atmosphere. Because fertilizer formulation processes use a lot of water, some companies have dug boreholes to supplement the water needs.

These companies do check the levels of chemicals used in fertilizer formulation in borehole water on a regular basis. The Ministry of Health has drafted toxic waste management Regulations which are being circulated.

3.5 FORMULATION IN PLANT PROTECTION AGRO CHEMICALS

The following technologies are used in formulating the above chemicals:-

- flowable plants
- Emulsifiable concentrate plants
- wettable powder plants
- granules plants
- pelletizer plants

Most of the plants used in this industry in Zimbabwe are more than 15 years old, however they are well maintained and in working order.

3.6 QUALITY CONTROL AND QUALITY ASSURANCE IN THE PLANT PROTECTION AGROCHEMICALS.

Most companies have quality control laboratories that ensure that products meet standards required by the Ministries of Health and Agriculture. Companies in the subsector are members of the International Group of National Associations of Manufactures of Agrochemicals Products (GIFAP), which sets standards on the safe use of agrochemicals. The companies formulate to international, regional and national standards.

4. BIO/BOTANICAL PESTICIDE DEVELOPMENT

The above pesticides controls undesired pests through the use of living organisms and plants. This method of controlling pests causes very little damage to the environment compared to the use of chemical pesticides.

In some countries spiders, wasps, and bacteria have been used to control pests. For example in Zimbabwe a bacteria, Bacillus thuringiensis (bio bit) is being used to control diamond back moth lava on brassica crop (vegetable leaf). Bio bit is not yet registered in Zimbabwe.

The Tobacco Research Board had developed and patented a living fungus, Trichoderma harzianum for active control of sore shin of tobacco plants. Also pyrethroids, which are natural products are used in pest control.

5. INTEGRATED PEST MANAGEMENT CONCEPTS

As indicated in 4, Zimbabwe is beginning to apply integrated pest management techniques which includes the use of biological/botanical pesticides. I would like to briefly discuss the following:-

- natural control in insect populations
- crop insect complexes
- insecticide use and the vacuum cycle
- insecticide use and the development of resistance
- use of cultural methods to stop the spread of pests
- integrated pest management (IPM)

5.1 NATURAL CONTROL IN INSECT POPULATIONS

Insects lay large members of eggs and have short life cycles. For instance the pest 'leafminer" (found in coffee) can complete 8-9 generations annually. This means that the potential for expansion in the populations of insects/pests is very large.

The potential for the above is never realised as most of insects die before reaching maturity due to natural control. Natural controls comes in the form of harsh weather conditions, diseases and activities of parasites and predators. Natural control ensures that insect/pest populations stay at an average level.

5.2 CROP INSECT COMPLEXES

Many crops habour many insect species. Some of the insects in these crops are haboured together with their natural enemies i.e. parasites and predators. A few of these are key pests which may or may not cause economic damage in a given year.

Most are present in low numbers and cause little or no damage at all - until misuse of insecticides which kills the minor pest's natural enemies. Because of that minor pests develop into insecticide-induced secondary pests.

5.3 INSECTICIDE USE AND THE VACUUM CYCLE

Spraying with a potent insecticide may create a vacuum as all pests on the plant are killed. As nature does not tolerate a vacuum more of the original pests including secondary pests come back in increased numbers. As a result more sprays are needed and a vicious cycle is created.

5.4 INSECTICIDE USE AND THE DEVELOPMENT OF RESISTANCE

The use of pesticides may not kill all the major/main pests and as a result a few of them remain. These will have resistance against the insecticide. After the spray the pests resistant to the insecticide reproduce and multiply thus producing more of the resistant variants.

Consequently successive sprays of insecticide may have no effort on the pests as they are resistant to it. For instance Bisset and van Rooyen working in Chipinge, Zimbabwe found out the use of PARATHION (an organophospate insecticide) on ANTESTIA populations on coffee resulted in the development of resistance (in the pest) to the insecticide.

5.5 USE OF CULTURAL METHODS TO STOP THE SPREAD OF PESTS

A cultural method of controlling pests in crop rotation. Pests are generally different for different crops. Use of crop rotation will result in decreased incidence of major/main pests. The use of ashes sprayed onto plants helps control pests.

5.6 INTEGRATED PEST MANAGEMENT (IPM)

Integrated Pest Management (IPM) is the integration in use of all available methods i.e. chemical, biological and natural, and cultural.

The following are some of the most important elements of IPM;

Selective use of chemicals which cause least disruption of natural enemies of the main/major pest.

use of chemicals in such a way that they cause least disruption e.g. stem treatment as opposed to foliar sprays.

selective spraying instead of routine spraying. Scouting has to be done on the crops pests before selective spraying is carried out. Routine spraying should be discouraged as it is counter productive.

- cultural methods of farming will contribute to keeping pest at low levels.

Extensive research has been done on IPM in coffee cultivation particularly in Chipinge, in the Zimbabwean Eastern Highlands.

RISK REDUCTION IN THE DEVELOPMENT OF AGROCHEMICALS IN THE AFRO-ARAB REGION

Interregional Expert Group Meeting
The Republic of Mauritius, 4-6 December 1996

Organized by

The United Nations Industrial Development Organization (UNIDO)
in collaboration with
The Ministry of Health, The Republic of Mauritius

Tentative Programme

Wednesday, 4 December 1996 - Opening Ceremony and Country Papers

08.30-09.00	Registration
09.15-10.30	Opening Ceremony * introduction * address of the UN Resident Representative * statement of WHO Resident Representative * statement of UNIDO Representative * opening address by the Honorable Minister of Health
10.30-11.00	Coffee break
11.00-11.15	Election of office bearers
11.15-11.30	Discussion and adoption of the agenda
11.30-12.15	Plenary lecture on Occupational Health & Safety relevant to Pesticide Production and Use by Dr. N. Cortes-Maramba from Philippines
12.15-12.30	Pesticide Poisonings in Mauritius Mr. A. Jackaria, Chief Forensic Science Officer, Mauritius
12.30-12.35	General announcements
12.35-14.00	Lunch
14.00-16.30	Presentation of Country Papers (session includes one coffee break)

Thursday, 5 December 1996 - Ecotoxicology, Biopesticides, Networking

09.00-10.30	Biopesticides - their relevance to the Afro-Arab Region (Dr. J. Menu, USA)	
	Botanical Pesticides in Mauritius by (Mrs. S. Facknath, University of Mauritius)	
	Importance of Ecotoxicology and Environmental Monitoring (Dr. B. Sugavanam, UNIDO)	
	Monitoring of Natural Water for Agrochemical Contamination in Mauritius (Mr. G. Umrit, MSIRI, Mauritius)	
10.30-11.00	Coffee break	
-12.30	Activities of the Regional Network on Pesticides in the Asia and the Pacific - RENPAP (Dr. S.P. Dhua, India)	
	Use of Modern Information and Communication Technology for Networking (Mr. K. Ziller, Germany)	
12.30-14.00	Lunch break	
14.00-15.30	Lead Paper Presentation	
	Introduction:	Dr. B. Sugavanam
	Arab Region:	Mr. K. Ziller
	African Region:	Dr. F. Kovats
15.30-16.00	Coffee break	
16.00-17.30	Presentation of Project Proposal	
	discussions on project proposal and assignment of working groups	

Friday, 6 December, 1996 - Group Discussions and Recommendations

-09.30	Raising Worker Protection Standards for Pesticide Users through Improved Protective Clothing in Tropical Countries by Anugrah Shaw, University of Maryland, USA
09.30-11.00	Group discussions
11.00-12.00	Coffee break
12.00-13.00	Presentation of results from group discussions
13.00-15.30	Lunch break
15.30-16.30	Conclusions and Recommendations
16.30	Closing Ceremony

EXPERT GROUP MEETING
RISK REDUCTION IN THE DEVELOPMENT OF AGRO-CHEMICALS
MAURITIUS 4-6 December 1996

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43	RAMGOOLAM	MR P	MAURITIUS	AG DIV. ENVIRONMENT OFFICER	MOE	212 4385		KEN LEE TOWER BARRACKS STREET
44	RATOVOARIVELO	MISS L.TIANA	MADAGASCAR	MOI HANDICRAFT AND TRADE	CHIEF SERVICE, TECH. & ENVIRONMENT	261 2 255 15	261 2 27790	BP 527 101 ANTANANARIVO
45	SHAW	DR ANUGRAH	USA	UNIV. OF MARYEAND	ASSOCIATE PROFESSOR			
46	SIBARTIE	DR RAVINANDAN	MAURITIUS	OCCUPATIONAL HEALTH CONSULTANT	MOH	211 2847	212 5060	ATCHIA BLDG, PORT LOUIS
47	SIVRAPRAGASAM	DR MRS S	MAURITIUS	OCCUPATIONAL HEALTH PHYSICIAN	MOH	424 2840	424 2840	15 ALOUETTES AVENUE SODNAC OBORNES
48	SULLIVAN	MR SYDNEY	MAURITIUS	PLANT PATHOLOGIST	MSIRI	454 1061	454 1971	REDUIT
49	SUVAGANAM	MR B	AUSTRIA	UNIDO	CHIEF A-CHEMICAL UNIT	0043 1 211313940	00431 1 21131 6819	C/O UNIDO PO BOX 300 VIENNA
50	TARAKMA	MR YOUSEF M AL	KUWAIT	AGRICULTURE AFFAIRS KUWAIT	DIRECTOR OF PLANT PROTEC. DIVISION	4723894 - 4765022	474 3619	AGRI AFFAIRS PLANT PROT. DIV.
51	THEU	DR M P K J	MALAWI	DEPT OF AGRI & RESEARCH	TEAM LEADER	265 767 225	(265) 784 184	BOX 158 LILONGVN
52	UMRIT	MR G	MAURITIUS	SCIENTIFIC OFFICER	MSIRI	454 1061	451 1971	REDUIT
53	VERMEULEN	MR J BERNARD	SOUTH AFRICA	NATIONAL DEPT OF AGRICULTURE GENERAL	SENIOR AGRICULT. MANAGEMENT	27 12 319 3303	27 12 319 7179	PRIVATE BAG 343 PRETORIA
54	ZILLER	MR KLAUS	GERMANY	UNIDO	CONSULTANT - Pesticide management	0049 6898 79177 OR 41972	0049 6898 79177 or 43153	AM DIETRICHSBERG 5, D-66333 VOELKLINGEN