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REGIONAL NETWORK ON PESTICIDES FOR ASIA AND THE PACIFIC

US/PAK/90/294/11-01/B/J13426

PAKISTAN

Technical report: Findings and recommendations\*

Prepared for the Government of Pakistan  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Erik Kirknel,  
consultant in ecotoxicology

Backstopping Officer: B. Sugavanam  
Chemical Industries Branch

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\* This document has not been edited.

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### Abstract

- Title:** Consultant for setting up Eco-toxicology Laboratory.
- Objective:** This third mission on the project consisted of a follow-up of the second mission, technical input in establishing the ecotoxicology laboratories and provide assistance in better understanding of the impact on ecosystem of especially pesticides, in order to implement working plans for the laboratory for the beneficial of Pakistan and RENPAP member countries. Collect informations on further equipment necessary to be purchased and evaluation of needed training for staff members. To participate active in planning the workshop for RENPAP members and submit papers to the workshop on appropriate issues.
- Conclusions:** Two papers and posters submitted to the workshop, one on Quality management in ecotoxicology, the other on methods for testing pesticides on beneficial organisms (Appendix IV and V).
- Importance of a steering group has been observed.
- Local agreements on training of staff members.
- Still vital items missing (listed for one year ago) from UNIDO for performing chemical analysis. No implementation of biological laboratories has taken place yet.
- A specific mandate and a training project for the following four months for the analytical laboratory was developed fall 1993, but is only to a very limited degree implemented.
- A supplementary list of items has been made.

**Recommendations:**

It is strongly recommended to establish a steering group as recommended fall 1993, delegating responsibilities to the individual scientists. The duty of the group should be to plan future training and secure implementation of such, to review the project document, the budget, make plans for the future and check success of the work. The steering committee should as a minimum consist of the scientists on the ecotoxcenter, the director Dr. U.K. Baloch, representatives from UNDP environmental activities and a trained analytical chemist preferably from outside NARC.

Hire a chemist on PhD-level in analytical organic chemistry.

It is recommended to start immediate training of staff in chemical analysis at NIAB, Faisalabad at Dr. Altaf Hussain. Dr. Hussain has agreed to train the staff for a period of 4-8 weeks each group, preferably consisting of 2 persons at a time. The price should be negotiated between Dr. Hussain and UNIDO. This local training will give the staff the background necessary for benefitting a stay in a well equipped modern laboratory abroad. The offer from Denmark, after this local training, is still valid, and agreements are made between Dr. U. K. Baloch and the consultant for such a training of at least 6 weeks training. The consultant will recommend 2 persons to participate in the training simultaneously. Documentation for the training will naturally be supplied after both local and danish training.

Terrestrial lab. is now starting to breed local beneficial organisms for testing the effect of selected pesticides.

Send a staff member on a two weeks training in Europe on "IOBC-test methods for beneficial organisms" with contact to Dr. Hassan Darmstadt (who will get him in contact with the appropriate scientist in Europe) and Dr. Jepson's team in Southampton. After this training the member will be able to list the necessary equipment for testing the selected pesticides.

Send the same staff member on a scheduled training course in:

"Pesticide registration and evaluation of pesticide effects on natural enemies- an international training course and workshop", late february to mid march 1995 for two weeks, at the Training Centre of the Malaysian Agricultural

Res. and Dev. Centre (MARDI). Tuition: 1520 \$ plus international travel.

Lab. f. microbiology should develop specific projects on the impact on soil microflora of local importance. There are numerous areas to select e.g. decomposition of organic matter, nitrification, chemoresistance.

In case of taking over responsibilities from REN-PAP, experienced scientists from that group should participate in the laboratory programmes.

Close cooperations with national and international laboratories are strongly recommended.

The consultant noticed that in spite of earlier recommendations, the arrival of instruments and supply has been delayed in an unacceptable degree, being a very big part of the reason for the absence of progress in the ecotoxcenter. Demotivation in the staff is an outcome of this one year delay. The following items should be emphasized:

Millipore reverse osmosis filter  
 Two Warring blenders  
 Gel filtration system (contact consultant before order in Aarhus, Denmark).  
 Chemicals  
 Tools and voltmeter (contact consultant).  
 Spare parts for GC from Perkin-Elmer, spare parts for HPLC still is not received to consultant, check address in report from fall 1993.  
 Especially is the P-filter for the FPD essential

Petty cash money to NARC. Especially is cash needed for mounting of pressure regulators on two GC's.

Establish the remaining two (of three) fume hoods.

Establish safety devices as prescribed earlier.

Buy a electric generator for vital instrumentation. The problem of power drop-out has increased the last 4 months to an extent of inhibiting analysis according to the staff members. The solution on the power drop-out is using a generator when running analysis on GC and HPLC. Preparing the samples for the analysis may be done on public power supply. It will be too costly to establish immediate power supply when power drop-out occur.

Additional items to be bought (contact consultant):

Chromatographic columns  
Silica gel  
Aluminum oxide

Dr. Lajos Volner, GSF, Munich, Germany (the second consultant present) has prepared a list of HPLC equipment, which will be forwarded to UNIDO.

It has been noted that an unacceptable traffic of personnel not connected to the Ecotoxcenter, has been running through the building. This traffic cause extremely severe problems of dust on the instruments. Especially traffic to room F-129. Availability of room F-129 and F-128 would be extremely beneficial for the Ecotoxcenter. 2 more rooms are needed for the present staff in order to perform scientific work.

**ABBREVIATIONS**

<b>PARC</b>	Pakistan Agricultural Research Council
<b>NARC</b>	National Agricultural Research Centre
<b>GC</b>	Gas chromatograph
<b>GLP</b>	Good Laboratory Practice, a quality assurance system based primarily on standard operating procedures (SOP's).
<b>HPLC</b>	High Performance Liquid Chromatography
<b>RENAPAP</b>	Regional network on Pesticides for Asia and the Pacific.
<b>UNDP</b>	United Nations Development Program
<b>UNIDO</b>	United Nations Industrial Development Organization
<b>FPD</b>	Flame photometric detector
<b>IOBC</b>	International Organization for Biological Control.
<b>NIAB</b>	Nuclear Institute for Agriculture and biology.
<b>NIBGE</b>	National Institute for Biotechnology and Genetic Engineering



## I INTRODUCTION

This report is made by Erik Kirknel, Ministry of Agriculture, Danish Institute of Plant and Soil Science, Department of Weed Control and Pesticide Ecology, Flakkebjerg DK-4200 Slagelse. The job description is reproduced in Annex I.

The first part of the mission took place on the 13-20th of february the second on 9th october to 6th november 1993 and the third part from 14th march to 9th of april 1994.

This third mission on the project consisted of a follow-up of the second mission, technical input in establishing the ecotoxicology laboratories and provide assistance in better understanding of the impact on ecosystem of especially pesticides, in order to implement working plans for the laboratory for the beneficial of Pakistan and RENPAP member countries. Collect informations on further equipment necessary to be purchased and evaluation of needed training for staff members. To participate active in planning the workshop for RENPAP members and submit papers to the workshop on appropriate issues.

The reports mentioned in Appendix III, describes the available reports done previous in the project.

## II SITUATION AT ARRIVAL AT NARC

### A. Status of the laboratories.

The laboratories where cleaned and painted to an acceptable degree.

### The status of glass ware, chemicals, small instruments and analytical instrumentation.

The situation was as described in report fall 1993 and a list of ordered equipment was not arrived. The remaining items is listed in "Recommendations".

## III FINISHING THE REARRANGING OF THE ANALYTICAL LABORATORIES

Fume hood and safety devices remains to be completed. Electric generators are necessary for continuous analysis of samples.

#### IV THE WORKSHOP SPRING 1994

The consultant participated in planning, performing and concluding on the RENPAP workshop, and submitted two lectures, Annex IV and V.

#### V CONCLUSIONS

Two papers and posters submitted to the workshop, one on Quality management in ecotoxicology, the other on methods for testing pesticides on beneficial organisms (Appendix IV and V).

Importance of a steering group has been observed.

Local agreements on training of staff members.

Still vital items missing (listed for one year ago) from UNIDO for performing chemical analysis. No implementation of biological laboratories has taken place yet.

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#### VI RECOMMENDATIONS

It is strongly recommended to establish a steering group as recommended fall 1993, delegating responsibilities to the individual scientists. The duty of the group should be to plan future training and secure implementation of such, to review the project document, the budget, make plans for the future and check success of the work. The steering committee should as a minimum consist of the scientists on the ecotoxcenter, the director Dr. U.K. Baloch, representatives from UNDP environmental activities and a trained analytical chemist.

Hire a chemist on PhD-level in analytical organic chemistry.

Development of working plans for all scientist's in the three sections is an urgent need.

It is recommended to start immediate training of staff in chemical analysis at NIAB, Faisalabad with Dr. Altaf Hussain.

Dr. Hussain has agreed to train the staff for a period of 4-8 weeks each group, preferably consisting of 2 persons at a time. The price should be negotiated between Dr. Hussain and UNIDO. This local training will give the staff the background necessary for benefitting a stay in a well equipped modern laboratory abroad. The offer from Denmark, after this local training, is still valid, and agreements are made between Dr. U. K. Baloch and the consultant for such a training of at least 6 weeks training. The consultant will recommend 2 persons to participate in the training simultaneously. Documentation for the training will naturally be supplied after both local and danish training.

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## APPENDIX I

## JOB DESCRIPTION

**Purpose of proj.** To establish an eco-toxicology laboratory at the National Agricultural Research Centre (NARC) Islamabad, belonging to The Ministry of Agriculture and study the fate and effects of pesticides in the environment and also make Pakistan effectively interact as Technical coordinator giving inputs to ecotoxicology to the Regional Network on Pesticides for Asia and The Pacific (RENAP).

**Duration:** 4 weeks in Islamabad, 1 week homebased march/april 1994

**Duty station:** Islamabad, Pakistan.

**Duties:** The expert who will be an ecotoxicologist will closely work with the National Project Director and other counterparts in giving advice and assistance in implementation of the project according to the work plan, objectives and activities within the framework of the budget provided. Apart from providing technical inputs in the area of ecotoxicology of chemicals widely used especially pesticides, the expert should assist in bringing together both industries and the users of pesticides and give lectures on the importance of the ecotoxicology laboratory and how it will serve to improve the knowledge and safety of these pesticides in the eco-system and how this is achieved in the developed countries.

The expert will also gather necessary information on the equipment to be purchased, placement of trainees and improve communication links between the central and the provincial laboratories. He is also expected to assist in the ecotoxicology to effectively participate in the Regional Network on Pesticides for Asia and the Regional Network on Pesticides for Asia and the Pacific (RENAP), to give substantive inputs in the field of ecotoxicology.

In this particular assignment, he is also expected to assist the counterparts in organizing a workshop on eco-toxicology for the Asia region. In this he will, with the assistance from the counterparts, assist to

organize suitable experiments, finalize the programme for the workshop, give lectures along with other experts, lead discussions and assist to prepare report of the meeting with recommendations.

During his homebased work he will identify the suppliers of equipment and also arrange any training to the counterparts on ecotoxicology and provide necessary advise for UNIDO to take action.

**Background information:**

Asia region is going through an accelerated industrial growth during the last 10-15 years and the both per capita chemical production and the use have risen enormously. Unfortunately the corresponding awareness and actions to deal with the chemical contamination in the environment has been very limited in many countries due to lack of facilities and expertise. UNDP in association with UNIDO has established RENPAP to promote safe development and management of pesticides. In the network there are 14 member countries covering almost half of the worlds population. Some selected countries have taken up specific areas to provide assistance to the region and UNIDO is providing technical assistance to increase the capacity of these countries in the chosen topics by linking with other national projects. The following topics are covered:

Formulation technology:	India
Quality control:	Rep. of Korea
Bio-botanical pesticides and Residue analysis:	Thailand
Occupational safety:	Philippines
Operational safety, Waste management and Environment safety:	Thailand
Application technology:	Malaysia
Data collection/Dissemination:	India
Ecotoxicology:	Pakistan

Pakistan has taken up ecotoxicology based on the facilities available. These facilities need to be strengthened and from the contribution of Denmark to UNIDO Industrial Development Fund (IDF) a project has been approved to strengthen the ecotoxicology laboratory of the National Agricultural Research Centre of the Ministry of Agriculture. The main aim is to link

pesticide industries with the ecotoxicology laboratory and make use of the facilities for carrying out experiments on the fate of pesticides they produce for Pakistan market. Self sustainability (partly or fully) of the project is also considered to be an important factor by providing services to industries, government institutions dealing directly or indirectly with pesticides.

**APPENDIX II**

**ITINERARY**

**ACTIVITIES IN ERC FROM 14TH MAR TO 14TH APR 94.**

Prepare the different laboratories for visitors from the workshop.

Made posters for the workshop.

Held meetings with staff members in order to clarify accomplished work according to mutually accepted plans from nov. 93.

Participating in the workshop with 2 papers.

Lectures and training the chem. staff in residue analysis.

Visit to NIAB and NIBGE, Faisalabad and Gomal University, Dera Ismail Khan (1th of april to 4th of april) in order to arrange local training for chem. staff members.

Setting up newly arrived instruments.



**APPENDIX III****REFERENCES AND REPORTS CONSULTED**

1. **CALDERBANK, A.**  
Unido report on environmental toxicology related to pesticides in Pakistan. DP/RAS/85/023. 1988.
2. **CALDERBANK, A.**  
Unido report on an Ecotoxicology Research Center in Pakistan. DP/RAS/85/023. 1990.
3. **FLETCHER, K.**  
Unido report on Establishment of an Ecotoxicology Center. US/PAK/90/294. 1992.
4. **KIRKNEL, ERIK**  
Unido report on findings and recommendations on establishing an Ecotoxicology Center in Pakistan. DP/RAS/88/031. 1993a.
5. **KIRKNEL, ERIK**  
Unido report on findings and recommendations on establishing an Ecotoxicology Center in Pakistan. DP/RAS/88/031. 1993b.

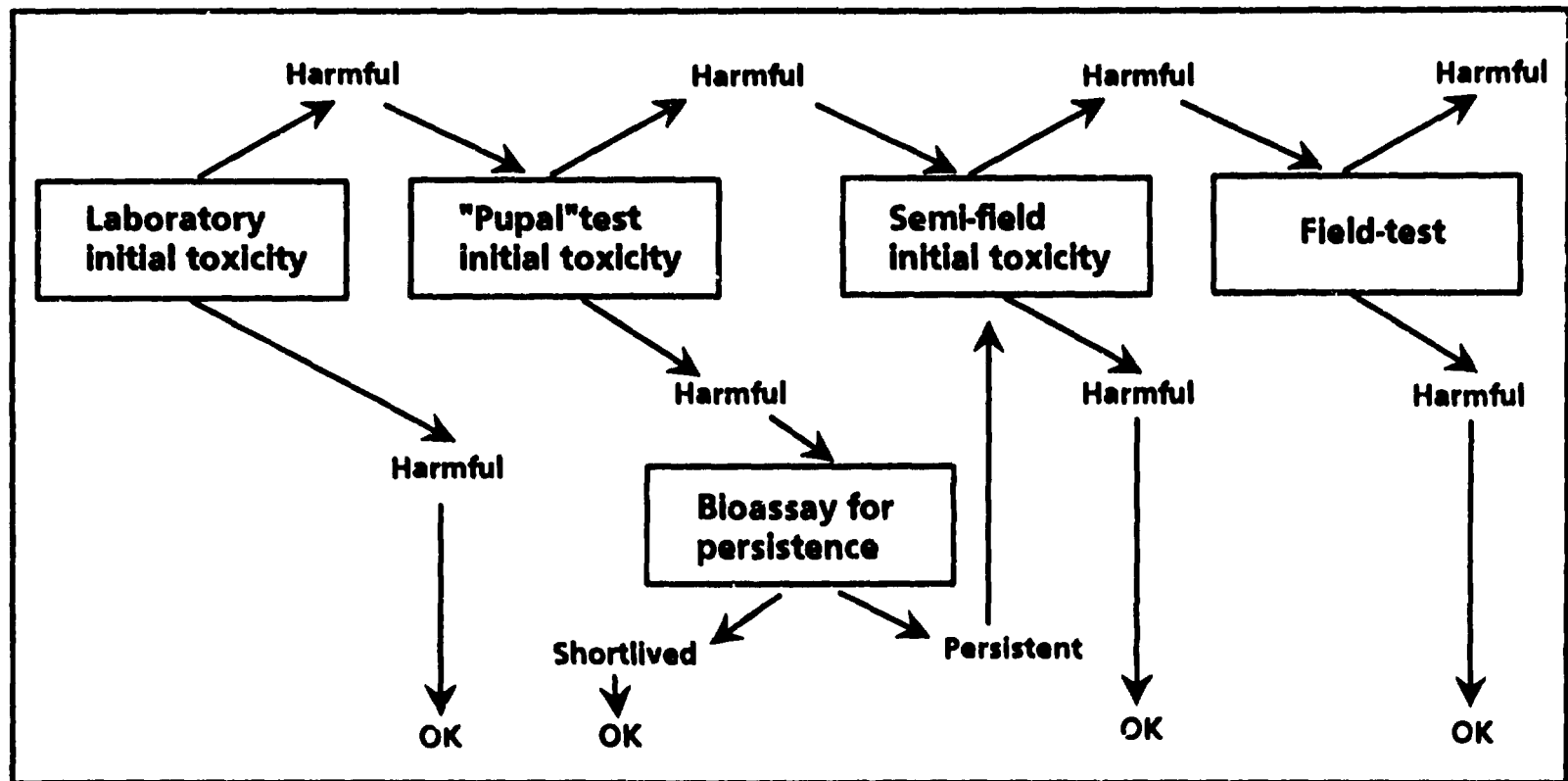


Fig. 1. Sequential testing scheme to beneficials (modified from 6 and 7)

## ANNEX IV

## UNIDO'S SUBSTANTIVE COMMENTS ON THE REPORT OF

MR. ERIK KIRKNEI, US/PAK/90/294/11-01

The report covers the work carried out by the expert to assist the workshop on ecotoxicology. While the workshop was successfully organized, the report clearly spells out actions to be taken by all parties concerned to steer the project towards intended outputs. In this, establishment of a 'Steering Committee' would give an overall guidance to proper functioning of the ecotoxicology centre. Some of the delays in delivery of equipment could not be avoided but now that all the major equipment is installed, the project authorities should start taking projects on ecotoxicology and environmental monitoring (initially soil and water).

The expert's recommendation to make use of an institute in Fasilabad and get some training in analytical chemistry is vital. In addition, UNIDO can assist in sending fellows to Malaysia as recommended by the expert.