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REGIONAL NETWORK ON PESTICIDES FOR ASIA  
AND THE PACIFIC

DP/RAS/85/023

Technical report: Training Programme on Pesticide Residue Analysis  
Bangkok (Thailand), 9 November - 11 December 1987\*

Prepared for the Governments of the Member States of the Regional  
Network (Afghanistan, Bangladesh, China, India, Indonesia, Pakistan,  
Philippines, Republic of Korea, Sri Lanka and Thailand)  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme  
in co-operation with World Bank and the Department of Agriculture  
of the Kingdom of Thailand

Based on the work of Y. Yingchol,  
Course Co-ordinator

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United Nations Industrial Development Organization  
Vienna

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\* This document has not been edited.

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## I. BACKGROUND AND TERMS OF REFERENCE OF COURSE COORDINATOR

In the framework of the regional Pesticide Network in Asia and the Pacific (project DP/RAS/85/023), a training course on pesticide residue analysis was organized by the Department of Agriculture (DOA) of the Thai Ministry of Agriculture and Cooperatives in cooperation with the World Bank and UNIDO. The course was held at the Division of Agricultural Toxic Substances' Laboratory, Bang-Khen, Bangkok, from November 9 to December 11, 1987.

Undersigned had been asked by the World Bank to fulfill a short-term consulting appointment to serve as course coordinator to the World Bank/UNDP pesticide evaluation and safety testing program for carrying out the following activities, in cooperation with RENPAF National Coordinator R. Syamanonda, the World Bank, UNIDO and the UNDP Resident Mission in Bangkok.

- (1) defining the overall course curriculum.
- (2) Scheduling, directing and coordinating the participation of short term expert instructors;
- (2) presenting lectures and laboratory exercises in technical area not covered by other instructors;
- (4) arranging logistic for course participants, including local transportation and accomodation, and assisting with the resolution of any unforeseen related problems;
- (5) arranging for the procurement and installation of materials and expendable supplies needed for the purposes of the course, and ensuring that the equipment and instruments needed are functioning;

- (6) at the end of the course, preparing a brief summary report including an informal evaluation of instructors' and students' performances as well as recommendations for procedural or technical improvements for a similar course next year.

Representative of the World Bank, Dr. J.G. Cummings Pesticide Chemistry-Regulatory Assistance was provided as Course Instructor and Lecturer cover the period of three weeks from November 9 to November 27 (A.V) Dr. R. Peterson of California Analytical Laboratory, another Course Instructor conducted laboratory exercises and gave lectures from 25 November to 11 December (A.V) Dr. Alan Brimfield of Westinghouse Bio-Analytic Systems Co. was invited as an expert on enzyme linked immunoassay methodology which seemed to be very much interested by all participants, provided demonstrations on that topic on November 23-24.

## II. SUMMARY REPORT

### A. SUBJECT MATTER

1. Assessed the facilities for the training course: Instruments were in good condition, necessary supplies were provided.
2. Prepared the copies of background information, lecture notes and references for all participants and observers.
3. Assisted the DOA staff in preparing the laboratory and practical exercises.
4. Arranged and scheduled the program, lectures and practical exercises, to cover all topics related to residue analysis which will help to achieve the objectives of this training course.
5. The lectures covered the following topics:
  - 5.1 Sampling and Preparatory Procedures.
    - Sample handling, storage and preparation.
    - Extraction methods.
    - Sample clean up procedures.
    - Statistical Aspects.
  - 5.2 Methods of Analysis.
    - Gas Chromatography.
    - High Performance Liquid Chromatography.
    - Spectrophotometry (UV, AA, MS).
    - Immunoassay/Elisa.
  - 5.3 Set-up and Management of a Pesticide Residue Laboratory.
    - Laboratory Safety

- Good Laboratory Practice.
- Data handling and Reporting.
- Confirmatory test.

5.4 Maintenance and Repair of Laboratory equipment.

5.5 Others.

- Regulatory Aspects.
- Metabolites.
- Concept of MRL, Joint FAO/WHO Food Standard Program.

**B. ORGANIZATIONAL ASPECTS**

1. Coordinated the course by cooperating with the World Bank, UNIDO and the local government.
2. The course was attended by 9 participants from 7 Asian countries, namely Afghanistan, China, India, Indonesia, Korea, the Philippines and Sri Lanka, and 4 participants from Thailand. 27 observers from Thailand were permitted to attend the lectures.
3. Consultant, lecturer/instructor and foreign participants were accommodated at the Golden Dragon Hotel, and the transportation was provided during the whole course.
4. Organized the course as follows :
  - duration : November 9 - December 11, 1987  
(about 5 weeks).
  - approximate 2 weeks of lectures on general topics, background information, special topics and techniques concerning pesticide residues analysis.
  - approximate 2 weeks of laboratory exercises and practical demonstration. Participants were separated into 3 groups, each group of 4-5

participants performed practical exercises under the supervision of instructors. The problems were solved and the results were discussed to achieve the appropriate procedures.

- approximate 1 week of study tours and field trips were organized in order to enable the participants and lecturers to observe the application of pesticides under practical conditions and visit other governmental laboratories working in the field of pesticide analysis and also the pesticide manufacturing plants.
- during the first week, country papers were submitted by participants of each country. The information was of great value in assessing the development of this region.
- local experts were invited to give lecture on special problems involving the pesticide residue analysis.

5. During the course 2 forms of questionnaires were handed out to each participant, the participants could give their views and comments on every aspects, for example, the content and the organization of the course. The answers were investigated and the evaluation of the course was reported.

### C. OBSERVATION AND RECOMMENDATIONS

A total of 13 trainees (including 4 local Thai participants) took part in the course. Towards the end of the course they were asked to fill in two types of questionnaires carrying similar type of approach in accessing the reaction of the participants to the course, the major difference being that one form asked the name of the trainee and the other type did not ask the trainee's name (models of the questionnaires shown in annex III and IV).



Among the 13 participants except one or two participants, all of them had a good knowledge concerning residue analysis and did work in residue analysis laboratories.

All the candidates uniformly pointed out about the very short time given to attend the course after acceptance of their nomination forms and also about the lack of information about the details of the course before leaving their respective countries.

Majority of the participants mentioned that the program content and organization of the course were just right. Regarding the length of the course the opinion was varied. Most of the candidates from the host country wanted shorter course (3 weeks) while others wanted longer period (6-10 weeks).

All the participants wanted more laboratory work and greater exposure to new analytical techniques like GC-MS, Immuno-Assay and residue analysis of newly introduced pesticides.

Regarding the question on their level of knowledge prior to and after the course the following response was mentioned.

<u>No. of Trainees</u>	<u>Rating</u>	
	<u>Prior to</u>	<u>After the course</u>
3	Poor	Very good
5	Good	Very good
1	Poor	Good
3	Good	Good
1	Good (-)	Good (+)

All the trainees mentioned that they will be using their knowledge gained in the course when they return to their countries.

Recommendations

- A. Based on the trainees response the following recommendations are made for consideration for the next course in 1989.
- I. Acceptance of candidates should be given well in advance of the commencement of the course.
  - II. More detailed information on the course should be sent to the candidates before their departure from their respective countries.
  - III. Country papers should be sent to the experts before the course.
  - IV. Make use of local (Thai) staff in assisting the trainees during the experimental part and ask them to participate as trainees only in areas where they lack knowledge.
  - V. Give more laboratory and hands-on training and greater exposure to instrument maintenance, immuno assay, analysis of new pesticides and analysis of foods and soil.
  - VI. Give greater emphasis on GLP, MRL, ADI, SOP, etc.
  - VII. Have one international expert a few days before starting of the course to organize final details.
  - VIII. Make use of one or two regional experts.
  - IX. A course of five-week duration seems to be the optimum length.

B. From the ATSD's point of view, the host country should be notified at least 6 months in advance so that the provision of all facilities, e.g. lecture facilities, laboratory facilities could be achieved. The nomination of instructors should be proposed long time in advance in case they can not accept the invitation, the substitution will be arranged in time in order that the curriculum of the course could be planned effectively. For the next training course, the ASTD as the host institute would like to recommend Dr. P.A. Greve from the Netherlands as the chief instructor.

ANNEX I

DOA/THE WORLD BANK/UNIDO/UNDP  
TRAINING COURSE ON PESTICIDE RESIDUE ANALYSIS  
November 9 - December 11, 1987  
Division of Agricultural Toxic Substances  
Department of Agriculture, Bangkok, Thailand

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Monday, November 9

- 10.00 - 12.00 Registration of Participants and Orientation.  
13.00 - 16.00 Visit UNIDO Office for per diem advances  
and administrative details.

Tuesday, November 10

- 9.30 - 10.30 Opening Ceremony  
- Reporting Address - Deputy Director, ATSD  
Mrs. Nuansri Tayaputch  
- Address - UNIDO Representative  
Dr. S.P. Dhua  
- Welcome and Opening Address  
Director General, Department of Agriculture  
10.45 - 12.00 Introduction to the course  
13.30 - 16.00 Country papers  
18.30 - 21.00 Reception at the Hyatt Central Plaza Hotel

Wednesday, November 11

- 9.00 - 10.30 Lecture by Dr. J.G. Cummings  
10.45 - 12.00 Personal Interviews  
13.00 - 16.30 - Concept of MRL  
Mrs. Nuansri Tayaputch  
- Significance of Pesticide Residue Level  
Mr. Chalut Sripijarn  
- Product Development (film)

Thursday, November 12

- 9.00 - 16.00 General Topics
- Reference standards
  - Importance and procurement sources
  - Laboratory safety
  - Development of a Pesticide Regulatory Program

Friday, November 13

- 9.00 - 16.30 Field Trip - Observe pesticide application to vegetables in a special Government demonstration project "Hygienic Vegetable Development Program" and visit Rice Research Institute.

Monday, November 16

- 9.00 - 10.15 MRLS, ADI, National tolerance, CCPR and JMPR  
Dr. J.G. Cummings
- 10.30 - 12.00 GC demonstration and students participation  
Dr. J.G. Cummings
- 13.30 - 16.30 Laboratory exercise - Recovery experiment
- Sample preparation
- Dr. J.G. Cummings

Tuesday, November 17

- 9.00 - 10.15 Good Laboratory Practice (GLP) and Metabblites  
Dr. J.G. Cummings
- 10.30 - 12.00 Continue recovery experiment
- 13.00 - 16.30 Visit National Environmental Board

Wednesday, November 18

- 9.00 - 10.15 Classical Statistic standard deviation coefficient and automatic data processing  
Dr. J.G. Cummings

- 10.30 - 12.00 Continue recovery experiment  
13.00 - 16.30 Visit ICI Asiatic (Agriculture) Co., Ltd.

Thursday, November 19

- 9.00 - 10.15 National Regulatory Program  
Dr. J.G. Cummings  
10.30 - 12.00 Continue Recovery experiment  
13.00 - 16.30 Visit Bayer Thai Company

Friday, November 20

- 9.00 - 16.30 Field trip : Observation of pesticide application on vegetables and fruits at Dannern Saduag & Sampran

Monday, November 23

- 9.00 - 16.30 - Theory of ELISA (Enzyme Linked Immuno-Sorbent Assay) methodology.  
- Demonstration  
Dr. A.A. Brimfield

Tuesday, November 24

- 9.00 - 16.30 - Immuno assay technique in pesticide analysis  
- Laboratory experiment  
Dr. A.A. Brimfield

Wednesday, November 25

- 9.00 - 16.30 Presentation by Dr. R.G. Peterson  
- Sample Handling  
- Storage  
- Sampling and Preparation of the analytical sample  
- Extraction methods

Thursday, November 26

- 9.00 - 16.30 - Basic Gas Chromatography (GC)  
- Basic Mass Spectrometry (MS)  
- GC/MS  
Dr. R.G. Peterson

Friday, November 27

- 9.00 - 16.30 Presentation by Dr. R. Peterson  
- Gas Chromatography (GC)  
- Theory  
- Application  
- Quantitation

Monday, November 30

- 9.00 - 16.30 - Discussion of Lab Exercise  
- Prepare, Spike and Extract Vegetable Samples

Tuesday, December 1

- 9.00 - 16.30 - Discussion of Quantitation  
- Gas Chromatograph Exercise

Wednesday, December 2

- 9.00 - 16.30 - Discussion of Quantitation  
- Gas Chromatograph Exercise

Thursday, December 3

- 9.00 - 16.30 - Discussion of Lab Exercise  
- Prepare, Spike, Extract and Clean-up soil samples

Friday, December 4

- 9.00 - 16.30 - Gas Chromatography Exercise  
- Discussion of GC results.

Tuesday, December 8

- 9.00 - 16.30 High Performance Liquid Chromatography (HPLC)  
- Theory  
- Application of HPLC in Pesticide Analysis  
- Trouble Shooting & Maintenance for GC and HPLC

Wednesday, December 9

- 9.00 - 16.30 - Absorption Spectroscopy  
- Emission Spectroscopy  
- Review and Special Problems

Thursday, December 10

- 9.30 - 12.00 Closing Session  
Director General of DOA - Chairman  
Present the Certificate of Attendance  
12.00 - 15 00 Lunch and Farewell Party



ANNEX II

List of Participants

Afghanistan

1. Ghausuddin Rostai  
Director  
Plant Protection  
Ministry of Agriculture  
Kabul  
Afghanistan
  
2. Sher Hasson Hussaini  
Director, Plant Pathology  
Department of Plant Protection and Quarantine  
Ministry of Agriculture  
Kabul  
Afghanistan  
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Gao Xiao Hui  
Institute for the Control of Agrochemicals  
Ministry of Agriculture, Animal Husbandry and Fishery  
Beijing  
People's Republic of China  
Telephone : (Office) 595929

India

1. Gita Kulshrestha  
Scientist  
Division of Agricultural Chemicals  
I.A.R.I.  
New Delhi - 110012  
India  
Telephone : 587390

2. Manjir Mukherjee  
Scientist  
R & D Centre  
Udyog Vihar  
Sector 20, Dundaheera  
Gurgaon  
Haryana  
India

Indonesia

Tieke Slamet  
Staff  
Pharm & Drug Research  
Ministry of Health  
JLN. Percetakan Negara No. 29  
P.O. Box 226  
Jakarta  
Indonesia  
Telephone : 413122 ext. 30

Korea (South)

Oh-Kyung, Kwon  
Division of Pesticide Chemistry  
Agricultural Chemicals Research Institute, ORD  
Suwon  
Republic of Korea  
Telephone : (Office) 0331-43-9805

Philippines

Bella Fe D. Carmona  
Market Analyst  
Fertilizer & Pesticide Authority  
Rajah Sulayman Building  
Benavidez St., Makati  
Metro Manila  
Philippines  
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Sri-Lanka

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2. Marasri Udomchoke  
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3. Sernporn Limpongsanuruk  
Scientist  
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4. Soraya Panwiriyaong  
Scientist  
Division of Agricultural Toxic Substances  
Department of Agriculture  
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Telephone : (Office) 5793578

**Abbreviations**

<b>DOA</b>	<b>Department of Agriculture, Bangkok</b>
<b>UNIDO</b>	<b>United Nations Industrial Development Organization</b>
<b>UNDP</b>	<b>United Nations Development Program</b>
<b>ATSD</b>	<b>Agricultural Toxic Substances Division</b>

UNITED NATIONS  NATIONS UNIES  
 UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

LENCHENFELDER STRASSE 1, A-1070 VIENNA, AUSTRIA  
 P.O. BOX 707, A 1011  
 TELEPHONE: 43 600 TELEGRAPHIC ADDRESS: UNIDO TELEEX: 7000

EVALUATION - GROUP TRAINING PROGRAMMES

Name of Participant:

Home country:

Programme:

Host country:

Year:

PRE-COURSE INFORMATION:

1. How was the introductory information you received in your home country about: (please mark an x in the suitable column)

	<u>Sufficient</u>	<u>Not sufficient</u>	<u>Missing</u>
Aim of the training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Content of the programme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of the programme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What, if any, other information do you feel should have been included:			

2. How many weeks before the beginning of the training programme did you receive the following information:

Information about the programme  weeks

Being accepted to the programme  weeks

Comments:

II. PROGRAMME CONTENT AND ORGANIZATION:

3. What is your opinion of the total duration of the course:

Too long

Just right

Too short

If not "just right", what, in your opinion, would be the most suitable duration for the course?

weeks

Please comment:

4. State your opinion about the daily schedule:

Too heavy

Just right

Too light

Comments:

5. Would you suggest any changes in the general nature of the training programme?

6. Do you feel that the training corresponded to your professional needs?

To a very large extent

To a large extent

To a sufficient extent

To a small extent

To a very small extent

Please comment:

7. Please give your opinion about the study visits (if any):

Please suggest other study visits that might have been valuable:

8. What do you think of the general level of the training?

Much too high

Too high

Adequate

Too low

Much too low

Comments:



9. Which subjects of the programme did you find most valuable?  
(please state reason; for example new subject, my speciality, relevant to my work, new information, etc.)

Subject

Reason

10. Which subjects of the programme did you find least valuable?  
State why (for example too elementary, inadequate instruction, irrelevant to my work, etc.)

Subject

Reason

11. Were there in your opinion any relevant subjects that were not adequately covered in the programme?

Yes

No

If yes, what did you miss?

12. Which changes would you have preferred in the methods of instructions?

	<u>no changes</u>	<u>more</u>	<u>less</u>
a) lectures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) group work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) demonstrations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:			

13. How did you find the general standard of the instructor with respect of:

	i) <u>command of English</u>	ii) <u>method of instruction</u>
Very good	<input type="checkbox"/>	<input type="checkbox"/>
Rather good	<input type="checkbox"/>	<input type="checkbox"/>
Fair	<input type="checkbox"/>	<input type="checkbox"/>
Poor	<input type="checkbox"/>	<input type="checkbox"/>
Very poor	<input type="checkbox"/>	<input type="checkbox"/>
Please comment:		

14. Did you have sufficient time for professional exchange of views with:

	i) <u>the programme staff</u>	ii) <u>fellow-participants</u>
Yes	<input type="checkbox"/>	<input type="checkbox"/>
No	<input type="checkbox"/>	<input type="checkbox"/>

15. How much did you benefit from these exchanges of views with:

	i) <u>the programme staff</u>	ii) <u>fellow-participants</u>
A great deal	<input type="checkbox"/>	<input type="checkbox"/>
Much	<input type="checkbox"/>	<input type="checkbox"/>
Somewhat	<input type="checkbox"/>	<input type="checkbox"/>
Little	<input type="checkbox"/>	<input type="checkbox"/>
Not at all	<input type="checkbox"/>	<input type="checkbox"/>
Please comment:		

III. RELEVANCE AND APPLICABILITY:

16. Did you find the contents of the programme relevant to conditions in your company (institute)?

To a very great extent	<input type="checkbox"/>
To a great extent	<input type="checkbox"/>
To a sufficient extent	<input type="checkbox"/>
To a small extent	<input type="checkbox"/>
Please state why:	

17. Do you feel that by participating in this training programme you have benefitted professionally?

To a very great extent	<input type="checkbox"/>
To a great extent	<input type="checkbox"/>
To a sufficient extent	<input type="checkbox"/>
To a small extent	<input type="checkbox"/>
To a very small extent	<input type="checkbox"/>
Please state why:	

18. Do you think you will have an opportunity to apply your newly acquired knowledge and experience in your present job?

To a very great extent

To a great extent

To a sufficient extent

To a small extent

To a very small extent

What difficulties, if any, would you expect to meet?

19. Will you be in a position to transfer your acquired knowledge to others in your home country?

To a very great extent

To a great extent

To a sufficient extent

To a small extent

To a very small extent

20. How will this transfer be done?

a) In day-to-day work to colleagues and subordinates

b) In specific training activities inside present employment

c) In specific training activities outside present employment

What difficulties, if any, would you expect to meet?

IV. SOCIAL ASPECTS OF THE PROGRAMME:

21. Please state your opinion about the leisure time activities organized by the programme staff:

What additional activities would you have appreciated?

22. Please give any comments you choose on aspects not adequately covered by this questionnaire:

DOA/The World Bank/UNDP/UNIDO  
Training Programme on Pesticide Residue Analysis  
November 9 - December 11, 1987

Questionnaire

Final Course Evaluation

Evaluate the objectives, course conduct, managements and others of each item by numbering 1,2,3,4,5 as rated below, Additional comments are appreciated.

- Rating : 1. Very poor
- 2. Poor
- 3. Good
- 4. Very good
- 5. Outstanding

I. Objectives

- ( ) Your knowledge concerned with the course, before training.
- ( ) Knowledge gained after training, at which you can be applied for your work.

Please comment, if you have any.

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**II. Course Conduct :**

- ( ) Programming of the topics.
- ( ) Teaching method
- ( ) Intensity and duration of each subject
- ( ) Lecture time
- ( ) Laboratory time
- ( ) Reference papers

If the topics and teaching method were not programmed systematically, please give us your suggestion to improve the training much better.

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.....  
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.....  
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.....

**III. Managements :**

- ( ) Coordination for course information before leaving your home country.
- ( ) Coordination during the course conduct.
- ( ) Pre-course information (i.e. briefing, orientation.)
- ( ) Accommodation
- ( ) Transportation
- ( ) Social programme
- ( ) Arrangement for observations and field trips.

- ( ) Excursion on holidays.
- ( ) Communication among participants.
- ( ) Communication between the host and participants.
- ( ) Communication between the lecturers and participants.

Please comment, if you have any.

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IV. Others :

1. Do you think that you will have chance to make good use of the techniques and knowledge you have attained in this course in your country, please comments.

.....  
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2. Please give us your comments and suggestions to  
improve the next training course.

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.....  
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Thank you for your good cooperation.