
IPCS

INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY

MULTILEVEL COURSE ON THE SAFE USE OF PESTICIDES AND ON THE DIAGNOSIS AND TREATMENT OF PESTICIDE POISONING

FEBRUARY 1994



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International Labour Office
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World Health Organization
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THE MODULES (on separate sheets):

Section I	- General
Section II	- Absorption and effects of pesticides
Section III	- Personal protection
Section IV	- Protection of others
Section V	- Chemical types and modes of action of pesticides
Section VI	- First aid treatment of pesticide poisoning
Section VII	- Medical treatment of pesticide poisoning
Section VIII	- Other related subjects
Section IX	- Evaluation

INTRODUCTION

1. BACKGROUND

It is already a half-century since modern pesticides began to be introduced. They replaced older plant-derived pesticides, such as nicotine, and other chemical pesticides, including the salts of arsenic. Many of the older compounds were highly toxic, and their use by the public was restricted in many countries. The advent of DDT, with its wide spectrum of activity and low human health hazard seemed to be full of promise for the control of agricultural and public health pests.

As the organochlorine pesticides were followed by organophosphorus compound and the carbamates, so the benefits of their use became apparent; rises occurred in both the quantity and quality of crops, and animal health improved. It cannot be disputed that the world could not have sustained the nutrition of its increasing population without the use of modern pesticides. They have also contributed significantly to improvements in human health through the control of vector-borne diseases.

After a few years it became apparent that these benefits were bought at a price. Target pest species began to develop resistance to the most widely used pesticides. To combat this, new compounds were introduced, some of which were of higher acute toxicity and hazard to humans and other non-target species. Unexpected adverse effects on the environment began to appear in both animals and plants. The use of pesticides had become so widespread globally that it was clear that control was needed. Never before had the public access to such a range of powerful and hazardous chemicals.

In recent years, strict regulation and training in the safe and effective use of pesticides have been introduced in many countries, but these are by no means universal. Detrimental effects on the environment still occur, particularly due to the misuse of pesticides. Many people are affected in various ways by pesticides. The number of these is difficult to estimate but it is considerable.

Ways of counteracting adverse environmental effects have been devised. Some of these include sophisticated application techniques to reduce the quantities of pesticides applied. Others are based on integrated pest control. The benefits of the proper use of pesticides remain, and the resilience shown by target species indicates that if pesticide use in good agricultural practice and in public health was discontinued, the results would be disastrous.

Over the years, the public has been faced with conflicting views on the use of pesticides, to the extent that many people are now confused or hold opinions that have little scientific validity. There is therefore a growing need for presentation of simple scientific facts to enable people to come to informed judgements. This can be done in schools, universities, or in public interest groups. Education in the use of pesticides cannot be confined to users, and the content of any course on the subject must contain material that can be adapted to a wider audience.

Many adverse effects of pesticides can be prevented if correct and appropriate techniques are used by trained personnel. Registration of pesticides is essential to set minimum standards for their safe and effective use, and to limit public access to the more hazardous compounds. This does not replace the need for the education of pesticide users. Training must be flexible so that it can be readily updated to include new compounds and techniques, and needs to be repeated at all levels as changes occur in personnel or application techniques.

This course is presented to try to meet the need for widescale training in the safe and effective use of pesticides.

2. OBJECTIVES OF THE MULTILEVEL COURSE.

This course is intended:

1. to prevent adverse effects of chemical pesticides by training in safe practices all those handling them after manufacture and formulation, in order to protect themselves, others, and the environment,
 - by outlining how such adverse effects may be produced, and
 - by describing techniques by which they may be prevented.
2. to train doctors and those giving first-aid in special aspects of the diagnosis and treatment of cases, should poisoning occur.
3. to provide insight into the safety aspects of the use of pesticides for those engaged in pesticide registration procedures, and for public interest groups.
4. to provide a structure which may be integrated into training in other aspects of the use of pesticides, at all levels, adapted to the needs of specific groups.

3. ARRANGEMENT OF THE MANUAL

PART I opens by outlining the structure of the course. It discusses the techniques that can be used in the conduct of courses, and contains an example of the basic module.

PART II gives suggestions for the training of trainers in a two-week course, and the organisation of training programmes lasting from one hour up to one week full-time or part-time equivalent, for various groups.

PART III opens with a list of modules, arranged in sections and subjects. This is followed by the modules, numbered according to the list. Each section is preceded by the educational objectives suggested for various levels.

4. EXTENSION OF THE MANUAL.

Training is not only required in the safe use of pesticides. Although this must be a persistent theme, related subjects are the correct choice of pesticides, application methods including correct dosage, the choice, care and maintenance of equipment, and environmental monitoring. Any course on safe use should be so structured that these subjects can be integrated into the presentation, and emphasized according to the needs of the groups undergoing training.

It will probably be found that the modules of the course as issued do not completely meet the needs of some groups. This is especially true when new topics are introduced such as those mentioned above. There is no limit to the number of modules that can be included in the course and most of these will have to be written locally. To be consistent with the rest of the course, these should be in the same format (See Table I/1, page 10).

Information on the numbering of new modules is given in the text at the beginning of Part III, 1. List of Sections, Subjects and Modules, page 19.

5. LANGUAGE OF THE COURSE.

All or part of this course may need to be translated into local language. If resources are limited, priority should be given to the modules, or at the very least to modules at the basic level.

PART I

1. PRESENTATION OF THE MULTILEVEL COURSE

This course is intended for those handling pesticides in any way, for those concerned with the control and registration of pesticides, and to provide basic information for others concerned with the safe and effective use of pesticides. The course material is designed so that each course may be presented at the appropriate educational level of the group being trained. Therefore, the subject matter has been broken down into a large number of succinct points, giving both information and/or specific advice or instructions. It is the task of the trainer to select the points most needed to achieve the educational objective of the group, and present these in the most relevant form. Other subjects concerned with the efficient use of pesticides can be introduced into any course, as necessary.

The course consists of modules, each concerning a learning point. The modules are grouped in sections, and subjects, and each is individually numbered within its subject. Educational objectives are outlined at the beginning of each section. An explanatory module is shown on page 10 and the list of modules is at the beginning of Part III, pages 19-28.

The advantage of the modular system is the ease with which a trainer can select for each course the modules most suited to the particular group, taking into account the educational level of the participants. To facilitate this, modules are drafted at three levels of detail and terminology. The system also allows the inclusion of material of national relevance, either where this is indicated or by the insertion of new modules dealing with other aspects of pesticide use.

The emphasis throughout the use of the course must be its relevance to the groups being trained. The participants should have some characteristics in common, such as occupation or interest, and educational level. It is difficult to foresee any circumstances in which all the modules in this course would be used in the preparation of a course for any particular group, except for training trainers in the use of this course.

The sections and subjects are arranged in a sequence that might be followed on a training course, but this should be flexible. The modules are intended to guide the trainer, and to act as lecture notes.

THE TRAINER SHOULD NEVER READ THE MODULE TO THE PARTICIPANTS. THE MODULES ARE WRITTEN IN A CONDENSED FORM, AND THE TRAINER MUST INTERPRET THEM TO THE PARTICIPANTS, AND MUST DRAW ON PERSONAL EXPERIENCE OR ON NATIONAL PRACTICES TO ENSURE THAT THE POINT MADE IN THE MODULE IS SEEN BY THE PARTICIPANTS AS APPLICABLE TO THEIR SITUATION AND EXPERIENCE.

2. LEVELS OF MODULES

The level of each module is shown below the module number, as follows:

- BASIC** ● A simple point for participants in any course.
- INTERMEDIATE** ● A more detailed point for participants with operational responsibilities or who work with compounds of high hazard, and need more understanding of preventive measures.
- ADVANCED** ● Point for participants with a scientific background, or who are trained in first-aid to a high level.

Modules at the advanced level may be further qualified as follows:

- /TECHNICAL** ● A technical point for those groups engaged in specified occupations.
- /MEDICAL** ● A point made specifically for health workers or first aiders.
- /REGULATORY** ● A point made for those engaged in pesticide regulatory activities or other aspects of pesticide control.

Literature references may be inserted into modules at the advanced level, if desired.

A suggested plan of the modules that may be used for the training of specific groups is shown in Table III/1 (page 29).

3. TIMING WITHIN THE COURSE

Only general guidance can be given as to how much of the course can be covered in a session (45-50 minutes), as this will depend very much on the participants. Some modules suggest discussion points, and these will take more time than a module which is only descriptive. In a comprehensive course lasting one or more days, it is probably not practicable to cover more than one section in a session. This is true regardless of the levels of the modules, as it is to be anticipated that the explanation of modules to a basic level course will take as long as a greater number of modules, some of which contain greater detail, to an intermediate or advanced level course.

Thus, considering that sections VI and VII are mutually exclusive, the fastest that a comprehensive course can be given is seven sessions. If courses are to be shorter than this, a very strict selection must be made. Modules are not all of the same length, but probably no more than 10 should be attempted in a session, if they are to be properly presented, and if participation of the trainees or the audience is to be encouraged.

4. USE OF VISUAL AIDS

Most modules suggest the type of visual aid by which it should be supported. These are in the forms of text, diagrams with or without words and photographs. The presentation of visual aids will depend on the facilities available. For all literate groups, text and diagrams can be written on blackboards, on turn-over sheets (flip-charts) of paper or card, or on transparent plastic film for overhead projection. All text must be written in the national language.

Photographs can be used as prints on a flip-chart, but are better made into slides for projection. They can be used for all groups. There are a few modules for which a slide will be suitable for all ethnic or national groups, but for most modules it is necessary to use photographs taken in the country or community in which the course is being given. This enables the trainees to identify with the situations pictured. All photographs showing a wrong practice must be clearly identified as such by a mark on the picture itself. This can be added to a slide with a felt pen.

It has been suggested that video tapes might be used. These require expensive facilities for both photography and projection, and familiarity with the use of the camera. Although a commentary can be added, such tapes should only be used as a last resort. Flexibility in the construction of each course is sacrificed, and the participants are unable to interact with the person presenting the course.

5. PHOTOGRAPHY OF VISUAL AIDS

Locally taken photographs have the greatest impact as visual aids. The photographs are best reproduced as 35 mm colour slides. A good quality camera is essential.

Although it is possible to photograph operations in progress, experience has shown that it is better to simulate operations, paying attention to fine details, especially those which concern safety but are not the subject of the photo being taken. Each shot should be taken several times from different angles, and the best chosen for inclusion in the course. The point made by a module may sometimes be illustrated by more than one photograph. The workers being photographed should be actually carrying out the operation, rather than posing in a static manner. A team of 7-8 workers should be used so that the same workers do not appear too frequently.

Since photographs should be taken in the field, it is important that the equipment needed should be available in the field when it is needed for photography. A list of equipment needed for most of the photographic modules is shown in table I/2 (page 11). Special arrangements have to be made for those modules dealing with agricultural aviation, or large scale mechanical spraying or fogging.

Table I/1. EXPLANATORY MODULE

Module No.: Example

Level: See Page 5

Section: Roman numeral, main subdivision of course.

Subject: Capital letter, topic within the section.

Number: Number, of this module within the topic.

Main points:

THE POINT(S) TO BE UNDERSTOOD BY THE PARTICIPANTS.

Words in capital letters provide emphasis, or indicate words or sentences that might be used in textual visual aids.

Example(s): of the main point, where applicable.

Subsidiary point(s):

Level: (if different from above.)

These add to the main point. Subsidiary points may be at a different level from the main point, and should only be mentioned to the participants if they are relevant to the group.

For discussion:

A question arising from the main or subsidiary points, sometimes to introduce national relevance. No answers are given as the group should arrive at its own answer. If the conclusion is incorrect, the trainer should make a note to return to the question later in the course when the participants have more knowledge.

Other information:

1. This section is to provide additional information to the trainer to enable him to answer possible questions, to indicate emphasis, or to cross-reference another module.
2. The headings of paragraphs on examples, subsidiary points, for discussion, and other information only appear in modules if there is an entry beneath them.
3. If the trainer considers that additional main points are needed, new modules can be drafted, using this format. See the text at the beginning of Part III, 1 (page 20).

Suggested visual aid: type of aid, plus a note on content or subject.

**Table I/2. LIST OF EQUIPMENT NEEDED FOR THE PHOTOGRAPHY
OF MOST PHOTOGRAPHIC MODULES**

Pressurized and mechanical hand sprayers
ULV equipment (if relevant)
Overalls or coveralls, or other suitable protective clothing
Plastic boots (2 pairs)
Canvas shoes
Neoprene gloves (2 pairs)
Plastic apron
Brimmed hats (2)
Plastic visors attached to headband (2)
Plastic visor attached to safety helmet
Scarves
Disposable dust masks
Tins with lids for food, cigarettes, etc.
Bowls for washing hands and face, and clothing and equipment
Water and soap
Mixing paddle and buckets
Scales, scoop, plastic bags
Spade or mattock
Empty combustible pesticide containers
Empty plastic pesticide liners for burying
Empty large drums (1-2)
Empty cartons and bags
Food sacks (several)
Animal feed sacks
Teapot

Note: This list is not complete, and other items may need to be added according to local circumstances. For example, chemical safety goggles may be recommended for some tasks outside the tropics.

PART II

ORGANIZATION OF TRAINING PROGRAMMES

A. FOR LEADERS OF COURSES TO TRAIN THE TRAINERS (TTT COURSES).

1. ORGANIZATION OF TTT COURSES. Courses are best arranged by institutes where experts and course facilities are readily available. The number of participants should not exceed 10, and the courses should last at least two weeks full-time. A typical programme is shown in Table II/1 (page 14).

2. THE LEADER'S PREPARATION. The leader of a TTT course must be familiar with both parts of the Manual, and must emphasize to the trainees the need to make the course relevant at all times to those whom they will be training. For this reason, flexibility has been built into the course, and success in training will depend considerably on how this flexibility is used.

3. SELECTION OF PARTICIPANTS. Before any courses can be started, it is important that the total number of people to be trained should be estimated. This number, and the geographical distribution of the courses will determine how many trainers should be trained. The educational standard of the trainers will vary with the groups, but it is essential that they should have background in the use of pesticides, and a general interest in both prevention, and in training techniques. Sanitarians and agricultural extension officers are the type of staff who make good trainers, provided that they are given adequate time to develop their knowledge and techniques.

4. BEFORE A TTT COURSE. The leader should allow at least three months lead time before a TTT course. During this time, various arrangements have to be made as set out below, and the success of the course will reflect the thoroughness with which this is done. Decisions should already have been made on whether the whole or parts of the course manual should be translated into local language.

- a) Select the participants, and arrange for their travel and accommodation for the duration of the course.
- b) Arrange suitable study accommodation for the course itself. A classroom with tables and chairs, a blackboard with chalk or a whiteboard with felt pens, newsprint flip charts with felt pens, a slide projector, an overhead projector, and a screen are all likely to be needed.
- c) Arrange that a copy of the course manual will be available for each participant to keep.
- d) Arrange for a supply of materials for the preparation of visual aids, and for any demonstration equipment for each participant. Blank newsprint, clear plastic sheets or rolls for overhead projection, and a set of felt pens for each participant will be needed. If photographs are available, a set for each participant should be reproduced. If they are not available, the provision of a set of templates for diagrams or drawings should be considered.

- e) Arrange for any guest lecturers needed and brief them on how their contributions will fit into the course. Lecturers other than the leader should take a number of sessions, at least one on each day. This maintains the interest of the participants, and lessens the load on the trainer. The lecturers should be asked to follow strictly the plan of the course, and will need a copy of the manual well beforehand for this purpose.
- f) Arrange for a field visit during the first week. Pay a preliminary visit to the site, and see if it is suitable for any more photographic visual aids. If so, these could be taken during the visit of the participants to illustrate the care needed to ensure the accuracy of the photograph in the context of the course. Arrange transport to and from the visit.
- g) Arrange 3-5 groups of 10-15 participants to be trained during three mornings in the second week. Arrange a field demonstration for each of these groups.

Table II/2 (page 15) suggests a check list for the organization of a TTT course.

Table II/1. SUGGESTED OUTLINE OF A TWO-WEEK TTT COURSE**Sessions: 45 - 50 minutes. Breaks: 10 - 15 minutes.****Morning: 4 sessions. Afternoon: 2 sessions.**

WEEK	DAY	MORNING SESSIONS				AFTERNOON SESSIONS	
		1	2	3	4	5	6
1.	1.	Objectives and planning		Arrangement of courses		Arrangement of manual	Teaching techniques
	2.	Section I, A, B		Section V, A		Section V, B, C, D	
	3.	Section II, A		Section II, B, C		Section III, A, B	
	4.	Section III, C		Section IV, A, B		FIELD VISIT	
	5.	Section VI, A,B,C				Section VII, A, B (optional)	Section VIII, A, B
2.	1.	Section IX				Preparation of visual aids	
	2.	Training by TTT course participants in groups to other selected courses				Evaluation of training experience each day	
	3.						
	4.						
5.	Evaluation and conclusion of the TTT course						

NOTES

- In the table above, the Sections are those listed on pages 19-28 in Part III of this manual. The letters refer to the subjects in each section, except for Section IX which covers the whole course.
- This timetable is intended to be flexible. During the sessions devoted to part B, participants should be advised to note the amount of time spent on each module, so that they can get an idea of timing in arranging their own courses. See also the section on timing of courses in Part II.
- The first session on Objectives and Planning should include the opening of the course, and time for each participant to introduce him or herself, briefly stating details of work and past experience. This tends to overcome shyness, and indicates to the leader those participants who are likely to be able to contribute useful experience during the course.

Table II/2. SUGGESTED CHECK LIST FOR A TTT COURSE

NAME OF COURSE:**DATES:****PLACE:****No. of participants:****ARRANGEMENTS**

Starting Date	Target Date	Date Completed
------------------	----------------	-------------------

SELECTION OF PARTICIPANTS:

Procedure:

Accommodation:

Travel:

PREPARATION OF PROGRAMME

(See Table II/3):

ARRANGEMENT OF GUEST LECTURERS:**ARRANGEMENT OF FIELD VISIT BY
WHOLE COURSE:**

Place:

Preliminary visit:

ARRANGEMENT OF TRAINING COURSES:

Places:

Preliminary visits:

Allocation of trainees:

REQUIREMENTS FOR WHOLE COURSE:

Manuals:

Photographic visual aids:

Notebooks, pens:

REQUIREMENTS FOR MEETING ROOM:

Tables and chairs:

Black or white board:

Flipcharts:

Blank newsprint:

Slide projector:

Overhead projector:

Screen:

Sheets or rolls of transparent plastic film:

Felt pens:

Demonstration equipment: gloves, visors,
dust masks:

Templates for preparation of visual aids?

OTHER NOTES:

B. FOR TRAINERS

1. THE TRAINER'S PREPARATION. The trainer of a course on the safe use of pesticides must be familiar with the whole of this Manual, must understand the characteristics of each group taking the course, and how the course can be adapted to make it relevant to each group. If it appears that there are gaps in the course, the trainer must know how to prepare and test new modules to cover specific circumstances or new subjects.

2. SELECTION OF PARTICIPANTS. There is no limitation on who may participate in a course. However, a course will be more likely to be successful if the participants share some characteristics, such as work itself, the types of pesticides being used, or scientific or educational background. Public interest groups are likely to be less homogenous than occupational groups, and therefore the approach has to be more general.

Participants are frequently nominated or selected by an organization sponsoring the course. In the early part of the first session of any course, the trainer should ask each participant to introduce him- or herself briefly to the group. This enables the trainer to estimate the level(s) of the participants, and also identifies those who are likely to play a more active participatory role in the course.

3. ORGANIZATION OF A COURSE. The **NUMBER** of participants should exceed 10 (to make it cost-effective to arrange the course), but should not be more than 20, as communication within the group suffers after this point.

The **LENGTH** of the course will depend on the group. The course should be split into sessions of no more than 45-50 minutes each, followed by breaks of 10-15 minutes. For occupational groups, a minimum of eight sessions should be planned, but 12-16 sessions would be better. Such courses could be spread over three mornings of four sessions each, or over three days, including a two session field visit, preferably on the second day. In courses lasting one day or more, the last session should include an evaluation of the course.

For a public interest group, only two sessions may be feasible, and therefore only a few aspects can be dealt with adequately.

4. BEFORE A COURSE. The trainer should allow at least six weeks lead time to make the preparations for the course.

- a) If the trainer has not selected the participants, obtain information on the characteristics of those selected.
- b) Either arrange suitable accommodation for the course, or visit the accommodation to be provided. A room in a quiet place is needed, furnished with tables and chairs. The availability of a black or white board, or a blank flip-chart should be checked. Slide and/or overhead projectors will probably be needed for the course. If these are not available, the equipment should be arranged, and an adequate power source should be ensured.
- c) Select the modules appropriate to the group, and make out the course programme for the number of sessions to be provided. See the notes on timing of sections, subjects, and modules in Part I.

- d) Select the visual aids for the modules chosen, and list any demonstration equipment that should be taken to the course.
- e) Decide if any handouts are to be given out during the course. Provide notebooks and pens or pencils, so that participants can make their own notes during the course.
- f) In longer courses, decide whether any guest lecturer will be included to take one or more sessions. This stimulates the participants and takes some load off the trainer, but guests must be briefed and asked to follow the modules selected.
- g) If a field visit is to be included in the course, arrange this or get details about it. In any case, make a preliminary visit to decide on the points to be covered during the visit.

Table II/3 suggests a check list for the organization of a course.

Table II/3. SUGGESTED CHECK LIST FOR A COURSE.

NAME OF COURSE:

Dates:

PLACE:

Number of sessions:

Number of participants:

Characteristics of participants:

PROGRAMME: (Enter module numbers. Draw a line under last session each day)

Session	Section	Subject(s)	No.s
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			

Guest lecturer?

Sessions:

Arranged?

FIELD VISIT? Sessions:

Place:

Preliminary visit (date):

Points to be covered:

MEETING ROOM:

Preliminary visit (date):

Tables

Chairs

Board B/W

Flip-chart

Power point

Slide projector

Overhead projector

Screen

Chalk

Felt pens

Notebooks

Pens/pencils

TO TAKE TO COURSE:

Handouts

Items missing above

Visual aids

Demo, equipment:

Gloves

Visor

Labels

Dust Mask

OTHER NOTES:

PART III

1. LIST OF SECTIONS, SUBJECTS, AND MODULES

Modules are arranged in Sections according to main topics. The Sections are numbered with Roman numerals I - IX. Each Section is subdivided into Subjects, which deal with aspects of the section topic. Subjects are denoted by letters A to D. Finally each Subject is subdivided into modules, each dealing with a single learning point. Modules are numbered 1,2,3, etc. within each Subject. The total number of the module therefore has three components, viz II B 4 (Section II, Subject B, module 4).

The detail of the modular number is given on the top of each module, and the number and level are repeated in the upper right hand corner to facilitate sorting and filing of modules.

The general arrangement is designed to give a logical development of each section topic, but this does not mean that modules should necessarily be presented in a course in numerical order. The various levels of the modules have not contributed to the arrangement as set out in this list, and therefore the trainer always has to make a choice of modules appropriate to the level of each group of trainees.

For this reason, and so that new modules can be interleaved, the modules are supplied in loose-leaf form. Nevertheless, the trainer is advised to file modules after use in the order in which they are numbered, to avoid future difficulty in finding specific modules.

An explanatory module is shown in Table I/1, page 10.

If new modules are written (see Introduction, 4. Extension of the Manual, page 5) this format should be used. Depending on whether new sections, subjects, or modules are introduced, they should be numbered as shown in the following examples:

Note: The new topics below are used only for the purpose of these examples.

Examples

1. New section to be inserted after existing Section: II(a) Application methods, followed by Subjects A, B, C, etc., and Modules 1, 2, 3, etc.
2. New Subject to be inserted into existing Section: Section I, General, Subject A(a) or C. Choice of pesticides, followed by Modules 1,2, 3, etc., depending on how the new subject fits logically in the sequence of subjects within the Section.
3. New module to be inserted into existing Section and Subject: Section I, Subject A, Module 6(a) Definition of concentration.

Titles of any new modules should be inserted into the list below.

Key to abbreviations in the list:

Suggested visual aids: T Text
 D Diagram with or without words
 P Photograph
 E Example or sample
 * indicates that national material should be included
 () Visual aid optional

Key to levels: B Basic
 I Intermediate
 A Advanced
 /T Technical
 /M Medical
 /R Regulatory
 - Indicates two levels in the same module

SECTION I: GENERAL

		Level	Visual Aid
Subject A: Definitions:			
No. 1	'Pest' and 'pesticide'	B-A	T
No. 2	Pesticide names according to target species	I	T
No. 3	Pesticide actions on target species	I	T
No. 4	Systemic pesticides	I	T
No. 5	Active ingredient, Formulations (a)	B	T
No. 6	Formulations (b)	I	T
No. 7	Household pesticide	B	T
No. 8	Definition of 'toxicity'	B-A	T
No. 9	Definition of 'hazard' and 'risk'	B	T
Subject B: Classification and labelling			
No. 1	Hazard classes	I	T
No. 2	Classification by formulation	I	T
No. 3	Importance of label	B	E*
No. 4	Contents of a label	A/R	E*

SECTION II: ABSORPTION AND EFFECTS OF PESTICIDES

		Level	Visual Aid
Subject A: Absorption			
No. 1	Routes of entry: through the skin	B	D
No. 2	Routes of entry: through the mouth	B	D
No. 3	Routes of entry: through the lungs	B	D
No. 4	Routes of entry: through broken skin	B	D
Subject B: Adverse effects of pesticides			
No. 1	Acute and long term effects	I	T
No. 2	Storage: accumulation of dose or effect	I	(T)
No. 3	Relationship of dose to exposure or effect	A	(T)
No. 4	Pesticides and cancer	I	(T)
Subject C: Control of pesticides			
No. 1	Registration of pesticides	B	(T)
No. 2	The Code of Conduct on the Distribution and Use of Pesticides	B-I	(T)
No. 3	Distribution of pesticides	I-A/R	(T)

SECTION III: PERSONAL PROTECTION

		Level	Visual Aid
Subject A:	Protection by hygiene		
No. 1	Objective of protection	B	T
No. 2	Washing	B	P
No. 3	Eating and drinking at work	B	P
No. 4	Smoking at work	B	P
No. 5	Chewing	B	P
No. 6	Household pesticides	B	P
Subject B:	Protection of the body		
No. 1.	The main part of the body	B	P
No. 2	The head and neck	B-I	P
No. 3	Lower legs and feet	B	P
No. 4	The hands	B	P
No. 5	The eyes	B	P
No. 6	The lungs	B-I	P
No. 7	Washing of clothing and equipment	B	P
Subject C:	Protection according to task		
No. 1	Responsibility of controllers and supervisors	I	T
No. 2	Knapsack spraying	B	P
No. 3	Pressurized hand spraying	B	P
No. 4	Mechanised spraying	I	P
No. 5	Dusting	B	P
No. 6	Mixing pesticides	B	P
No. 7	Bagging pesticides	B	P
No. 8	Supervising the field	I	P
No. 9	Maintaining the equipment	I	P
No. 10	Acting as a flagman	I	P
No. 11	Controlling pests commercially	A/T	P
No. 12	Loading pesticides	I	P
No. 13	Piloting an aircraft applying pesticides	A/T	T

SECTION IV: PROTECTION OF OTHERS.

		Level	Visual Aid
Subject A: Other people			
No. 1	Introduction	B	T
No. 2	Transport by truck	B	P
No. 3	Transport by boat	B	P
No. 4	Storage of pesticides	I	P
No. 5	Locking up	I	P
No. 6	Storing and using household pesticides	B	P
No. 7	Exclusion from sprayed crops	B	P
Subject B: Other organisms: the environment			
No. 1	Results of pesticide contamination	I	P
No. 2	Disposal of wash water in a pit	B	P
No. 3	Disposal of wash water as a diluent	B	P
No. 4	Disposal of containers by burying	B	P
No. 5	Disposal of containers by burning	B	P
No. 6	Decontamination of containers	I	P
No. 7	Disposal of large quantities of unwanted pesticides	I	-

SECTION V: CHEMICAL TYPES AND MODES OF ACTION OF PESTICIDES

		Level	Visual Aid
Subject A: General points			
No. 1	Names of pesticides	B	E*
No. 2	Modes of action of pesticides	I	-
No. 3	Mixtures of pesticides in the field	I	-
No. 4	Manufactured mixtures of pesticides	A	-
Subject B: Insecticides			
No. 1	Organophosphorous compounds	I/A	T*
No. 2	Carbamate compounds	I/A	T*
No. 3	Organochlorine compounds	I/A	T*
No. 4	Pyrethroid compounds	I/A	T*
Subject C: Rodenticides			
No. 1	Warfarin	I	T*
No. 2	Warfarin derivatives	I	T*
No. 3	Other rodenticides	I	T*
Subject D: Other pesticides			
No. 1	Paraquat and diquat	I	T*
No. 2	Pentachlorophenol and related compounds	I	T*
No. 3	Metals	I	T*

SECTION VI: FIRST AID TREATMENT OF PESTICIDE POISONING

		Level	Visual Aid
Subject A:	Symptoms and signs (1-4)		
	Symptoms and signs, treatment (5-8)		
No. 1	General	B	T
No. 2	Organophosphorous poisoning	I	T
No. 3	Carbamate poisoning	I	T
No. 4	Organochlorine poisoning	I	T
No. 5	Pyrethroid insecticides	I	T
No. 6	Poisoning by rodenticides	I	T
No. 7	Poisoning by paraquat and diquat	I	T
No. 8	Pentachlorophenol and related compounds	I	T
Subject B:	Treatment		
No. 1	General principles	B	T
No. 2	Poisoning by organophosphorous compounds	I	T
No. 3	Poisoning by carbamate compounds	I	T
No. 4	Poisoning by organochlorine compounds	I	T
Subject C:	Local treatment of splashes of pesticides		
No. 1	In the eye	B	P
No. 2	On the skin	B	P

SECTION VII: MEDICAL TREATMENT OF PESTICIDE POISONING

		Level	Visual Aid
Subject A: History, signs and symptoms			
(and treatment for (No. 8))			
No. 1	History	A/M	T
No. 2	Organophosphorous poisoning	A/M	T
No. 3	Carbamate poisoning	A/M	T
No. 4	Organochlorine poisoning	A/M	T
No. 5	Pyrethroid insecticides	A/M	T
No. 6	Rodenticides	A/M	T*
No. 7	Paraquat and diquat poisoning	A/M	T
No. 8	Pentachlorophenol and related compounds	A/M	-
Subject B: Treatment			
No. 1	General principles	A/M	(T)
No. 2	Poisoning by organophosphorous compounds	A/M	(T)
No. 3	Poisoning by carbamate compounds	A/M	(T)
No. 4	Poisoning by organochlorine compounds	A/M	T
No. 5	Pyrethroid insecticides	A/M	(T)
No. 6	Poisoning by rodenticides	A/M	T
No. 7	Paraquat and diquat poisoning	A/M	T

SECTION VIII: OTHER RELATED SUBJECTS

		Level	Visual Aid
Subject A: Administrative subjects			
No. 1	Selection of staff	A	-
No. 2	Records of exposure to pesticides	I	D*
no. 3	Reporting of cases of poisoning	T	T*
Subject B: Scientific subjects			
No. 1	Field testing of cholinesterase activity	A	P
No. 2	Interpretation of cholinesterase results	A	T

SECTION IX: EVALUATION

Method that may be used for evaluation of courses.

NOTE ON EDUCATIONAL OBJECTIVES

Educational objectives are set out at the beginning of each Section. These and table III/1, Specimen Module Selection for Specified Groups below are given for guidance only. Trainers must be free to choose only those modules relevant to the groups actually being trained, and each group should finish their course feeling that it has been entirely relevant to their work. To include too much in a course is as likely to affect its usefulness as including too little.

2. SPECIMEN MODULE SELECTION FOR SPECIFIED GROUPS

The table below is indicative only, and should not be followed exactly. The choice of modules for any group will depend on the educational level of the participants, their contact with pesticides in their work or in their homes, and the pesticides to which they may be exposed.

Public interest groups will vary greatly in their background, and the reasons why they are attending a course. For this reason, no educational objectives are given for these groups but suggestions will be found in the table III/1.

Table III/1. SPECIMEN MODULE SELECTION

GROUP:	L	M	N	P ¹	R	S	
L	Spraymen in a malaria control campaign.						
M	Supervisors of agricultural spraymen.						
N	Health workers in agricultural area.						
P ¹	Agricultural aviation personnel.						
R	Pesticide registration personnel.						
S	Public interest group.						
Sec.	Subj.	L	M	N	P ¹	R	S
I	A	1,5,8,9	1-6,9	1-9		1-9	1,5,7,8,9
	B	3	1-3	1-3		1-4	1,3
II	A	1-3	1-4	1-4		1-3	1-3
	B		1,4	1-4		1-4	1
	C		1	1,3		1-3	1,2
III	A	1-5	1-5	1-6		1-6	1,6
	B	1-7	1-7	1-7		1-7	
	C	1,3,6,7	1,2 4-9 ²		9,10 12,13	11	
IV	A	1-3	1-5,7	1		1,7	1,6,7
	B	2-5	1-6	1,6		1-7	1
V	A	1	1-3	1-4		1,2,4	1,3
	B		1-4 ³	1-4 ³		1-4	
	C		1-3 ³	1-3 ³		1-3	
	D		1-4 ³	1-4 ³		1-3	
VI	A	1	1-8 ³	1-8		1	1
	B	1	1-4 ³	1-4		1	1
	C	1-2	1-2	1-2		1-2	1-2
VII	A	This section is for medical officers.					
	B						
VIII	A		2,3	1,3		3	
IX	This section is for the trainer.						

¹ As appropriate modules for group M, with the additional modules shown.

² As relevant to the work undertaken.

³ As relevant to the compounds used.

3. TERMINOLOGY USED

The module number is given for words defined in a course module to increase familiarity with the modules. Medical terms used in Section VII have not been included in the glossary.

ABSORPTION	The process by which a chemical is taken into the tissues of plants and animals.
ACARICIDE	A chemical which controls mites and ticks.
ACCUMULATION OR CUMULATION	Of a chemical: Increase in the amount of a chemical in the body when absorption exceeds excretion. Of an effect: An effect produced by repeated doses which singly do not produce any effect.
AEROSOL	A fine mist of solid or liquid particles suspended in air.
AVICIDE	Module I A 2.
ACTIVE INGREDIENT	The biologically active part of the pesticide present in a formulation.
ANTIDOTE	A chemical or drug intended to counteract the effects of a poison.
BIOACTIVE	Affecting the structure or function of living organisms.
BIOLOGICAL CONTROL AGENTS	Module I A 1.
CARCINOGENIC	Causing cancer.
CHOLINESTERASE	An enzyme present in animals and essential for proper nerve function.
CONCENTRATE	A pesticide which requires dilution before application.
CLASSIFICATION	A distribution (of pesticides and their formulations) into classes according to their hazard, etc. Module I B 1.
DETOXIFICATION	Processes in the body whereby a toxic substance is rendered less harmful.
DILUENT	Inert material used to dilute a concentrate.
DOSE	The amount of a chemical administered to an organism.
DUSTABLE POWDER	Module I A 6.

EFFECT	The result on an organism of more than a threshold or higher dose of a chemical.
EMETIC	A chemical which will cause vomiting.
EMULSIFIABLE CONCENTRATE	Module I A 6.
ENZYME	A highly selective protein which enables reactions to take place in living cells or body fluids under physiological conditions.
EXPOSURE (to a chemical)	The situation in which the contact between the chemical and an organism might result in absorption of the chemical by the organism.
FIRST AID	Emergency treatment given to a sick or injured person before medical aid is available.
FOGGING CONCENTRATE	Module I A 6.
FORMULATION	Module I A 5.
FORMULATOR	An industrial concern which adds one or more pesticidal active ingredients to other chemicals to make a mixture suitable for application.
FUNGICIDE	Module I A 2.
GRANULES	Module I A 6.
HAZARD	Module I A 9.
HERBICIDE	Module I A 2.
HOUSEHOLD PESTICIDE	Module I A 7.
INGEST	Eat or swallow, take in through the mouth.
INHALE	Breathe into the lungs.
INSECTICIDE	Module I A 2.
LARVICIDE	Module I A 2.
LD₅₀	Module I A 8.
MICRO-ORGANISM	Virus, bacterium or fungus, or a unicellular plant or animal.
MITICIDE	Module I A 2.
MOLLUSCICIDE	Module I A. 2.

OIL MISCIBLE LIQUID	Module I A 6.
ORGANISM	Any living thing, plant, animal, or micro-organism.
PASTE	Module I A 6.
PELLET	Module I A 6.
PEST	Module I A 1.
PESTICIDE	Module I A 1.
POTENTIATION	The result when one chemical enhances the toxicity of another so that their combined effect is greater than the addition of the effects of each.
POUR-ON FORMULATION	Module I A 6.
PRE-HARVEST INTERVAL	The time that must elapse between the latest application of a pesticide to a crop, and the harvest of the crop.
RISK	Module I A 9.
RODENTICIDE	Module I A 2.
SOLUBLE POWDERS	Module I A 6.
STORAGE (of a chemical in the body)	Deposition of a chemical in an organ or tissue of the body in which it is apparently inactive as long as it stays there.
SPECIFICITY	The capacity of a chemical to affect only the target organism, without affecting other organisms in the same environment.
SYNERGIST	As applied to pesticides, a chemical without pesticidal action which enhances the action of a pesticide. As applied generally, synergism is sometimes synonymous with potentiation.
SYSTEMIC PESTICIDE	Module I A 4.
TABLET	Module I A 6.
TARGET AREA	The area to be treated with a pesticide.
TARGET SPECIES	The species that a pesticide is designed to control.
TECHNICAL PRODUCT	Module I A 5.
THRESHOLD	The minimum dose or concentration of a chemical at which an effect is first induced.

TOXICITY	Module I A 8.
WATER IN OIL EMULSION	Module I A 6.
ULV LIQUID (UL)	A pesticide formulation designed to be applied at ultra low volume (less than five litres per hectare).
ULTRA LOW VOLUME (ULV)	A volume of pesticide spray applied at a very low rate per unit area.

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No.	9	DDT and its derivatives
	15	Tin and organotin compounds
	29	2,4-Dichlorophenoxyacetic acid (2,4-D)
	34	Chlordane
	38	Heptachlor
	39	Paraquat and diquat
	40	Endosulfan
	41	Quintozene
	42	Tecnazine
	43	Chlordecone
	44	Mirex
	45	Canphechlor
	62	1,2 Dichlorethane
	*63	Organophosphorous insecticides - a general introduction
	*64	Carbamate Pesticides - a general introduction
	66	Kelevan
	67	Tetradifon
	71	Pentachlorophenol
	73	Phosphine and selected metal phosphides
	76	Thiocarbamate pesticides - a general introduction
	78	Dithiocarbamate pesticides, ethylenethiourea, propylenethiourea - a general introduction
	79	Dichlorvos
	82	Cypermethrin
	83	DDT and its derivatives - environmental aspects
	84	2,4-Dichlorophenoxyacetic acid - environmental aspects
	87	Allethrins
	89	Formaldehyde
	90	Dimethoate
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	92	Resmethrins
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	97	Deltamethrin
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101	Methyl mercury
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12	Tecnazine	47	Atrazine
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14	Heptachlor	50	Captan
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24	Allethrins	66	Trichlorfon
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31	Tetramethrin	75	Methyl parathion
32	d-Phenothrin	77	Propachlor
33	Permethrin	79	Methamidophos
34	Fenvalerate	80	Monocrotophos
38	Cyhalothrin and lambda-cyhalothrin	81	Benomyl
		82	Carbendazim

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IRPTC produces data profiles on pesticides which can be used to provide information on human health and environmental effects and which could therefore usefully provide advice on the safe handling of pesticides. Requests for data profiles should be addressed to the Director, IRPTC/UNEP, Palais des Nations, 1211 Geneva 10, Switzerland.

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PART III

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