

Meeting Report

Fifth International Workshop of the Scientific Committee on Pesticides of the International Association on Occupational Health

Preface

The Vth International Workshop of the Scientific Committee on Pesticides of the International Association on Occupational Health was held in The Hague, The Netherlands on October 9—11, 1979.

The subject "Field worker exposure during pesticide application" was chosen during the previous Workshop held in Bratislava in 1977 which recommended:

- further development of methods for assessment of exposure
- development of practical exposure tests for application on a wide scale
- improvement of the use of information obtained from human studies on the determination of dose—response relationships.
- assistance from manufacturers of pesticides in data collection from field studies for advice on health protection of field workers.

Thirty-eight invited experts from all continents and working in international organisations, governmental agencies, universities or industries, discussed twenty-five papers. Each paper contributed in its own way to the evaluation of the progress that has been made in the implementation of the recommendations of the previous Workshops.

General introduction

The chairman, Professor Rosival, opened the Workshop with a survey of the activities of the Scientific Committee on Pesticides since its inception in 1971. He stressed the task of the Committee in identifying and evaluating the specific hazards of the handling and application of pesticides, and the need to collaborate with WHO and other organisations on the promotion of health protection of exposed workers. The work of this Committee is an integral part of the international program on chemical safety based on and incorporating current WHO activities.

In the papers of this session, attention was drawn to the importance of assessment of exposure in the field and of medical examinations for compound related effects. This should be done in order to provide data for the formulation of guidelines on occupational health surveillance of workers and to evaluate possible environmental health hazards.

Depending on the results of toxicity testing, it may be necessary to check the extrapolation from experimental animals to man by means of surveillance

of exposed workers in the early phases of the development of new pesticides, novel formulations or new application techniques.

Adequate epidemiological studies are necessary to detect specific toxic effects, in particular when these effects only occur in the long term. These studies are difficult as exposures to several pesticides frequently occur simultaneously or sequentially.

In the discussion it was noted that, unfortunately, medical surveillance to protect the health of exposed people in which information is also obtained on human toxicology is sometimes inaccurately described as "human experimentation".

Technical papers

Three papers were presented on technical aspects of pesticide formulation, application and personal protection. It was very clear that a good understanding of these technical aspects is essential for the control of hazards for occupationally and environmentally exposed people. Significant reduction of exposure and risk appears to result from the use of certain described methods in formulation and application.

National experts, in collaboration with government officials who know local conditions and cultural habits as well as other requirements, should collaborate closely with manufacturers to design appropriate formulations, packaging, labelling, and application methods, and to supervise instruction of personnel.

In the discussion it was suggested that too much should not be expected from protective clothing. Even when used, it may give false reassurance and, when not appropriate, may increase exposure and even lead to other conditions such as heat stress. Further work is needed to design effective and practicable protective clothing.

It was emphasised that personal hygiene is extremely important, although there are still gaps in our knowledge on the best means of removing chemical contamination of the skin. The use of alcohol-impregnated cleansing tissues may enhance absorption.

Reports on field studies

Five reports on field studies were presented and discussed on the first day. These dealt with exposure to organochlorine compounds, organophosphorus compounds, carbamates and chlorophenoxy acetic acids.

From the pictures shown by some speakers it was evident that inappropriate handling of pesticides is a problem in both developed and developing countries.

Various techniques for the measurement of exposure were described. Biological monitoring of blood and/or urine was sometimes combined with, and related to, personal air sampling. In these cases an assessment of dermal ab-

sorption can be made which may stimulate a critical inspection of handling procedures and (re-) instruction of the workers.

In the discussion the following important observations were made.

- Experimental animal toxicology should be carried out in experienced and recognised laboratories: the results wherever obtained should then be valid everywhere. Field evaluations, on the other hand, should be made under local conditions or under similar conditions where the specific human and environmental factors are taken into account.
- There is an urgent need for practical, reliable and inexpensive methods and equipment for field work, in particular in the developing countries, to effect quick measurements giving rapid results.
- In some countries it may be impossible to find an adequate control population as the whole population may be exposed to some extent to the pesticide under investigation.
- It is essential in field studies, whenever possible, to obtain a medical history and to perform a physical examination of the subject. Sometimes this may be the only opportunity for a person to have a medical examination and be referred for treatment.

If indicated and possible, sensitive techniques should be applied which measure functioning of relevant organs and/or physiologic systems.

Eight papers were presented on the second day dealing with the measurement of exposure of workers engaged in the handling of organophosphates, a pyrethroid and methylbromide. In some studies the biomedical effects were also measured. One paper reported on physical factors possibly influencing the performance of aerial sprayers (high temperatures, vibration and noise). The effect of these factors may be additive with an perhaps potentiate the effects of exposure to pesticides.

In the discussion several important observations were made and subjects were suggested for further research.

- There was no consensus on which types of cholinesterase should be measured. It appeared that there is still not enough knowledge about the biological significance of plasma ChE, whole blood ChE and erythrocyt ChE. This problem is particularly relevant in field work as one prefers to test only one type of ChE under field conditions.
- The possibility of allergic reactions in relation to pyrethroids apparently needs further evaluation as cases of possible allergic-type reactions (skin and respiratory) were reported by some of the participants. However, other participants only had knowledge of the occurrence of the well-known skin sensations — in particular in the face — which are described as a local paraesthesia. It is not clear if the described allergic reactions were due to the pyrethroid itself or to the carrier. It appeared that in moderate or cold climates more subjective symptoms occur after exposure than in tropical areas. The reason for this is also an item for further investigation.
- Much attention was given to the need to inform workers and supervisors in understandable words on the objectives and procedures of field investi-

gations. They should also be informed of the results in understandable terms. Relations with the publicity media need careful consideration when a field study is planned. Early involvement of the press and explanation about objectives and procedures may be a valuable, time-saving activity.

- It was recommended that an international code of practice for hazard elimination and health protection during aerial pesticide spraying should be devised.

Miscellaneous contributions

The Workshop also considered six papers dealing with other scientific aspects relevant to field workers exposure.

- In the investigation of effects of mixtures of simple similar acting compounds it was found that equitoxic doses are usually additive to give a toxic effect, even if the individual compounds are present only in very low concentrations which would in themselves not give rise to such an effect.
- The porphyrinogenic potential of a number of pesticides was screened in chicken embryo cultures with and without enzyme induction. Some organophosphorus compounds as well as other pesticides had a porphyrinogenic action in the test system. Studies in exposed people are planned.
- The importance of impurities in technical products was discussed, mentioning examples illustrating possible health effects. Identification and evaluation of impurities was advocated.
- Two papers dealt with the basic principle and with techniques of the measurement of cholinesterase inhibition. Investigations were discussed which can be used for OP-compounds to calculate re-entry times into sprayed fields.
- The role and aims of GIFAP (Groupement International des Associations Nationales de Fabricants de Pesticides) were explained and it was stated that GIFAP will consider cooperating in field studies when general — rather than specific — product problems are involved.

Recommendations

1. The Workshop considers field studies essential to gather information on the exposure patterns, on possible biomedical effects and on development of methods for occupational surveillance of field workers. This is to enable hazard to be assessed and to define more precisely what routine surveillance may be needed for occupational groups.
2. Field studies should be carried out under representative conditions where human and environmental factors are taken into account.
3. The design and the protocol of a field study should take into account:
 - the specific properties of the pesticide;

- the symptomatology and the mode of action, if known, of the pesticide as derived from experimental toxicology;
- method of application;
- the total and ambient conditions;
- the cultural characteristics of the workers.

Such designs should be as flexible as possible to anticipate unexpected events, but should always meet the scientific objectives.

4. Field studies should be carried out wherever possible with the approval of governmental authorities and if possible also in consultation with international organisations, such as WHO, ILO, FAO, etc. The importance of good public relations is stressed.

5. In our present stage of knowledge, determination of cholinesterase activity is the best practicable method of measuring exposure to organophosphorus pesticides. Field methods exist but could be refined; quality control and comparative studies should be encouraged. Many years of experience with cholinesterase determination in a wide variety of circumstances of organophosphorus exposure has indicated that, for the avoidance of acute effects, a person should cease to be exposed to these compounds when the whole blood, or red cell cholinesterase activity falls more than 30% below a well established (mean of three tests) pre-exposure value, until the value rises to 80% of the pre-exposure value. Significant depressions of plasma cholinesterase on their own indicate exposure but should not lead to suspensory action. They nevertheless indicate a need for reviewing of safety precautions. This recommendation is in line with the recommendations of previous Workshops of the Committee.

6. There is a need for a careful evaluation of possible local or allergic reactions caused by pyrethroids.

7. Agricultural pilots may be exposed to special hazards. Codes of practice should be developed to minimise these.

W.F. TORDOIR

*Group Toxicology Division,
Shell Internationale Research Mij. B.V.
The Hague*

Proceedings of the above Workshop have recently been published in book form by Elsevier Scientific Publishing Company, P.O. Box 211, Amsterdam, The Netherlands: *Field Worker Exposure during Pesticide Application* by W.F. Tordoior and E.A.H. van Heemstra-Lequin (Eds.), Vol. 7 of the series *Studies in Environmental Science*, ISBN 0-444-41879-2, price US \$47.25/Dfl. 97.00. Standing orders for the series are also possible.