

**Report of the 2nd OECD Workshop
on
Pesticide Risk Indicators**

*Braunschweig, Germany
1-3 June 1999*

Contents

Part 1. Report of the Workshop Plenary

Introduction and Background	1
Workshop Objectives.....	1
Workshop Format	2
Conclusions.....	2
1. Outcome of the Aquatic Risk Indicators Project.....	2
2. Confirmation of the Copenhagen Principles for Developing and Using Indicators	2
3. Lessons Learned about Developing and Using Pesticide Risk Indicators	3
4. Demand for Indicators.....	4
Recommendations.....	5
1. Aquatic Risk Indicators	5
2. Terrestrial and Human Health Risk Indicators.....	6
3. Completion of Current Projects.....	6

Part 2. Breakout Group Reports

Report of Group 1	7
Report of Group 2	15
Report of Group 3	19
Report of Group 4	26

Annex 1. Workshop Participants.....

29

Part 1. Report of the Workshop Plenary

Introduction and Background

This report presents the results of the 2nd OECD Workshop on Pesticide Risk Indicators, held in Braunschweig, Germany on 1-3 June 1999. The purpose of the workshop was to advance OECD work on pesticide risk indicators, by reviewing progress to date and recommending avenues for future work. In particular, the workshop reviewed the outcome of a project on pesticide aquatic risk indicators, which was carried out in response to a recommendation made by the 1st OECD Workshop on Pesticide Risk Indicators, held in Copenhagen in April 1997.

The workshop was organised by the OECD Working Group on Pesticides and was hosted by the German Federal Biological Research Centre for Agriculture and Forestry (BBA) and the German Ministry of Agriculture. The workshop was chaired by Dr. Wolfgang Zornbach of the Ministry of Agriculture. Professor Dr. Fred Klingauf, President of the BBA, and Dr. Ralf Petzold, Head of the Ministry of Agriculture's Division for Plant Protection, gave opening speeches.

Sixty people attended the workshop, including government officials from 17 OECD countries and representatives of the European Commission, the United Nations Food and Agriculture Organisation, and the pesticide manufacturing industry. A list of the workshop participants is attached in Annex 1.

The principal papers used in the workshop were:

- The report of the aquatic risk indicators project,
- The report of a survey of pesticide risk indicators developed and used in OECD countries,
- The report of the Copenhagen workshop.

In keeping with the goals of the OECD Working Group on Pesticides, the workshop focused exclusively on pesticide risk indicators designed for use as government policy tools, i.e. for tracking pesticide risk trends over time at a national or regional level, using data on pesticides that are generally available to OECD governments.

Workshop Objectives

The workshop had three objectives.

The first was to review the outcome of the pesticide aquatic risk indicators project, carried out between March 1998 and May 1999 by an Expert Group created by the OECD Working Group on Pesticides. The project reviewed possible indicator approaches and designed three contrasting indicators that could be used to track pesticide risk trends in the aquatic

environment. The project tested and evaluated the indicators using real data on pesticide risks and use.

The second objective was to review the principles for developing and using indicators adopted in Copenhagen. The workshop was asked to revisit these principles to see if they were still applicable, in light of the experience gained in the aquatic indicators project and in individual OECD countries that have worked with indicators. The workshop also reviewed the criteria for indicators adopted by another OECD body, the Joint Working Party on Agriculture and Environment.

The third objective was to recommend how the OECD Working Group on Pesticides should proceed with its work on pesticide risk indicators.

Workshop Format

The workshop was held in alternating plenary and breakout group sessions. It included two key plenary sessions: the opening session on Day 1, which presented the results of the aquatic indicators project, and the opening session on Day 2, which summarised the results of the survey of national pesticide risk indicators and had presentations from eight countries that have developed national indicators. Following these and the other plenary sessions, the workshop participants split into four breakout groups to discuss the issues in detail. The breakout groups provided a record of their discussions both in oral presentations to the workshop plenary, and in the written reports attached in Part 2 of this report. The breakout group reports, and the plenary discussions of them, served as the basis of this report.

Conclusions

1. Outcome of the Aquatic Risk Indicators Project

The workshop agreed that the OECD project on pesticide aquatic risk indicators had been a successful project and had produced much useful information. The workshop agreed that by investigating the main approaches that could be used in aquatic risk indicators, the project had saved a great deal of time for individual countries that would otherwise have had to investigate these same approaches. Moreover, the workshop noted that the Expert Group and consultants that carried out the project offered a greater range of expertise and experience than would likely have been available to individual countries. The workshop commended the Expert Group and consultants for a job well done.

2. Confirmation of the Copenhagen Principles for Developing and Using Indicators

The workshop agreed that the three indicators developed in the OECD aquatic indicators project adhered to the Copenhagen principles for developing and using indicators. The workshop confirmed that these principles remained valid and pertinent, though they may sometimes be difficult to adhere to.

The workshop underscored the importance of certain of the Copenhagen principles, namely that:

- indicators should be neither too simple nor too complex
- the methodology used in indicators should be clear and the data put into them available and reliable
- the outputs of indicators should be easily understood by government officials and stakeholders
- all terminology should be explained clearly.

The workshop also reaffirmed the Copenhagen workshop's statement that the main purpose of any risk indicators developed by the OECD Pesticide Programme should be to combine information on pesticide risk (hazard and exposure) with information on pesticide use, in order to track risk trends over time. Indicators would therefore complement, not duplicate, pesticide risk assessment and registration, and could help national governments to:

- identify potential trouble spots and areas where risk reduction might be needed
- monitor the impacts of pesticide policies and programmes
- communicate the aims and results of pesticide policies and programmes
- obtain information about aggregate risk associated with use of multiple pesticides
- compare risks associated with different pesticides and different situations
- provide information for other types of indicators, such as indicators of advances in integrated pest management.

The workshop found that the aquatic risk indicators developed in the OECD project also adhered to the criteria for indicators adopted by the OECD Joint Working Party for Agriculture and Environment, in that the indicators are:

- **policy relevant** – because they respond to risk reduction measures
- **measureable** - because they use data that exist
- **analytically sound** - because the results can be interpreted in a meaningful way, using knowledge of pesticide toxicity, fate and use
- **usable at different levels of aggregation** – because they were so designed.

3. Lessons learned About Developing and Using Pesticide Risk Indicators

Based on their discussion of the OECD aquatic indicators project and of individual countries' experiences with pesticide risk indicators, the workshop expanded the Copenhagen principles with the following 'lessons learned':

Indicator design and interpretation

- When designing an indicator, it is very important to be clear about the indicator's purpose. The purpose will help to determine how sophisticated a methodology is needed and how much and what types of data are needed.

- When interpreting and communicating indicator results, it is again important to be clear about the indicator's purpose. Different purposes may require different ways of presenting results.
- OECD governments need to learn how to use pesticide risk indicators, and how to interpret and communicate their results and limitations.

Missing data

- Missing data can be a significant barrier to the use of indicators. Both the Expert Group and individual countries reported problems with missing data. Activities that would lead to more complete and useful data would be very helpful to the successful use of indicators. For example, it would be useful to develop a shared database on pesticide properties, starting with existing databases (including that developed for the aquatic indicators project), although the work to create and maintain such a database would be substantial. In the meantime, indicator users should state clearly what they did to estimate, or compensate for, missing data.

Limitations and drawbacks of indicators

- Indicators can be useful as signposts and analytic tools, but they are crude measures and should not be the sole basis for decision-making. Risk trends and other information shown by indicators should be confirmed by a closer investigation before regulatory action is taken.
- Indicators are just relative measures, not exact measures of real risk, and some see this as problematic. Whether or not it is important for an indicator to correspond closely to real risk depends upon the purpose of the indicator and how it is used.
- Different indicators provide different results, and it is not yet possible to say which results are most accurate. The workshop observed that this could reduce confidence in the reliability of indicators and make their results difficult to communicate. On the other hand, given the real-life complexity and uncertainty of risk, the workshop noted that using several different indicators could provide richer information than could be obtained from just one indicator, and could promote improved decision making. In other words, several „alarm systems“ would be better than one, lowering the chance of missing something important.

Validation of indicators

- It would be valuable to validate indicators, but this might not be possible in the classic sense. Monitoring should be done to check indicator results.
- Apart from being consistent with regulatory risk assessment, indicators should complement (and not contradict) other risk reduction policy tools.

Hidden benefits of indicators

- Working with indicators can increase knowledge about how pesticides are used, and can lead to better coordination among agencies within individual countries or to creation of better databases.

4. Demand for Indicators

The workshop observed that there seems to be a general demand for pesticide risk indicators, that the level of activity on indicators has increased greatly since the Copenhagen workshop, and that interest among most OECD countries is high. Within the OECD there is a wide range of experience: some countries have a great deal of experience in developing and using indicators, whereas others are just at the beginning stages and would like to progress.

In light of this, the workshop concluded that it would be valuable for OECD countries to continue to work together on developing pesticide risk indicators in other areas, using the same approach used in the aquatic indicators project. The workshop acknowledged that developing and using indicators required "learning by doing", and that it was important for OECD countries to continue the cooperation and momentum created by the aquatic indicators project and the Braunschweig workshop.

Recommendations

1. Aquatic Risk Indicators

The workshop recommended that the OECD Working Group on Pesticides undertake a pilot project in which countries could try using all three indicators developed in the OECD aquatic risk indicators project. The workshop recommended that the Working Group develop a project proposal and create a steering group (possibly drawing from the Risk Reduction Steering Group and the Indicator Project Expert Group) to direct and oversee the project.

The workshop recommended that the project:

- include all three aquatic risk indicators, the simplified versions of these indicators, and possibly other selected indicators (the other indicators could be piloted together with the aquatic indicators, either exclusively by the countries that developed them or by other project participants as well)
- include training on the indicators developed in the course of the project
- be designed so as to allow countries to participate at different levels, e.g. as active participants or observers
- include interim as well as final reports, a means for the project participants to compare results of the project, and a mechanism for non-participants to obtain information about the project and its results.

Before initiating the pilot project, the workshop noted that, within reasonable timelines, OECD would need to:

- identify the work items, possible costs, resources and expertise needed to participate in the project

- allow countries sufficient time to decide whether to participate
- create a user-friendly interface for the indicator program used in the aquatic project.

2. Terrestrial and Human Health Risk Indicators

The workshop agreed that:

- although the Working Group on Pesticide should give priority to the work on aquatic risk indicators, it would be useful to begin work on terrestrial and human health indicators as soon as time and resources permit
- in preparation, countries already working with such indicators could share their experience, and the Working Group could collect and distribute information on such indicators and on post-registration information (e.g., monitoring).

3. Completion of Current Projects

The workshop recommended that the Working Group on Pesticides:

- complete and publish the Aquatic Indicators Project Report
- complete and publish (all or parts of) the OECD Survey of National Pesticide Risk Indicators.

Part 2. Reports of the Breakout Groups

Report of Group 1

Session 1: Application of the (OECD) Aquatic Risk Indicators

To start, Group 1 began by sharing their experiences with, perspectives on, and interest in, the development and use of pesticide risk indicators. The Group represented a wide spectrum of experience, with some members having significant experience in developing and using indicators and others being at more beginning and intermediate stages. Members of the Group also brought experience in hazard indicators based on toxicity for human beings, toxicity to main non-target arthropods and risk of contamination of ground water.

All of the Group had a clear interest in learning from the efforts of others and in using the results of the workshop to further their country's, or organisation's, work in this area.

The first breakout session addressed two questions:

1. what did members of Group 1 think of the three aquatic pesticide risk indicators developed by the OECD Expert Group; and
2. how might these indicators be used within OECD countries.

The Group's discussion in response to these questions is summarised below by key topics.

1 Complexity versus simplicity

The Group was concerned that the three indicators might be complex to use within a country, primarily because of the detail of their construction and because appropriate data on both pesticide use and properties are not already available in useable form. So the tasks of gathering and preparing the data for use in these indicators may represent real challenges.

At the same time, the results, or outputs, of these indicators should be in a form that is readily understood (simple) by administrative regulators (and policy makers) and which provides meaningful information to help understand risk trends over time. In the case of these specific indicators, the results were seen as fairly simple to grasp. However, to assure responsible interpretation and use, a variety of other information and analysis would be important.

2 Indicators as signposts

The Group agreed that these indicators, and risk indicators generally, are really signposts and not direct measures of risk. Consequently, they should only be used as analytical tools to raise questions and trigger sharper and more focused thinking about complex risk issues, rather than as answers in themselves. Much other information, of many types (as illustrated by the examples in the Expert Group Report), must be brought to bear in interpreting and assessing indicator results. Used in this way (peeling back the layers of the onion) indicators can provide feed back to regulators that may allow countries to improve and redirect their risk management efforts.

3 Regulators need to learn how to use indicators

For many in the Group, there is currently little experience in using risk indicators as part of the overall regulation of pesticides and management of risk. As a result, the Group felt regulators would need to understand the limitations of these or other risk indicators. They would also need to clearly know what risk concerns were of importance to them so they could determine to what extent any set of indicators would actually provide information addressing their concerns.

There was also discussion, but no general conclusion at this point, about the use of indicators to help set risk management goals or to monitor progress in achieving them. There was also some concern that risk indicators should reflect the specificity of each country or, for example, the specific conditions of the countries of the mediterranean area.

4 Post-registration monitoring can complement risk indicators

Post-registration monitoring of ecological effects would be useful to assess what are the real world effects of risk management efforts and whether risk indicators are reliable signposts. The Group discussed a series of questions about whether current monitoring efforts are well correlated with risk concerns and the need to co-ordinate monitoring activities with risk indicator development and use.

5 Need for inter-agency partnerships

The discussion about monitoring led the Group to identify the need for better co-ordination between government agencies. Better co-ordination might help increase the availability of useful data for developing risk indicators. Although many agencies may currently collect data of potential use, such data are not necessarily shared as effectively as they might be. Better co-ordinated data collection and sharing would also assist in more useful interpretation of indicator results.

6 Validation

The Group briefly touched on the question of validation of the indicators. The general view was that this would be an important aspect of determining the usefulness of the indicators and future work associated with their acceptance and development. There was a concern as to how trends in estimated risk could be validated. The Group did not have time to explore specific concerns or approaches.

7 Use of risk indicators as communication tools

The characteristics of risk indicators which can make them useful analytical tools to sharpen thinking also make them challenging to use effectively and responsibly as communication tools for sharing information with the general public on risk trends and risk management results. There was concern that, used improperly or without care, the public could be misled. More thought needs to be given to these communication challenges.

Session 2: Guiding Principles for Developing and Using Risk Indicators

The second breakout session addressed three questions:

1. what did members of Group 1 think of the indicators presented by a number of countries;
2. what are the common experiences, problems, and lessons learned in developing and using indicators; and
3. are the principles and criteria for indicators developed at Copenhagen and York still appropriate?

The Group's discussion in response to these questions was extensive and is summarised below by key topics.

1 Extent of commonality

The Group considered that, despite obvious differences, there was still a lot of commonality between the indicators. This was particularly so with respect to the use of sales data, toxicity information, and exposure information in the development of indicators. Nevertheless, the Group felt that the potential benefits of the indicators would be enhanced if the individual indicators could be better aligned to achieve greater consistency in approach to the development of such indicators. This might also alleviate concerns raised about the similarity of results produced using different data bases and the comprehensiveness and scientific validity of some of the indicators.

The Group also commented that a great deal had been learned and gained from just developing the indicators. Some of the major benefits of indicators lie in the questions which are raised in their development with respect to, for example, aspects considered during assessment and registration. Another benefit lay in explaining differences as between indicators.

The Group also expressed some concern about ways in which different variables were combined or added and how to interpret results based on different combinations.

2 Handling of Risk

The indicators were all designed to provide insights to relative changes in estimated risks between different activities and/or over time. Despite the potential benefits of such insights, the Group was concerned about the potential usefulness of the indicators with respect to their ability to provide insights to actual risks. Insights to actual risks was considered by some members of the Group to be the real test of the potential usefulness of the such indicators.

Another issue of potential concern was the ability of the indicators to separate out the influence on intrinsic risk of area treated. For example, would the quantity of a pesticide applied over a large area be inherently more risky than if the same quantity were applied over a smaller area?

The Group also discussed the importance of ensuring a balance in the construction of the indicators. This was particularly so with respect to ensuring that the methodology for calculating the indicators was consistent with the quality of the data available. There was no

point in having a sophisticated methodology if the quality of data would not justify any confidence in the calculated indicator.

3 Purpose of indicators

The Group stressed, on several occasions, the importance of clearly specifying the objective(s) of the indicator. Any comments about the usefulness of indicators should be in the context of the purpose for which the indicator was developed.

The Group also stressed the need to engage stakeholders interested in the indicators at an early stage in their development. Such would help to achieve greater ownership, the development of more meaningful indicators, and limit the potential for the misuse of the indicators.

The Group concluded that the pursuit of a single indicator would be inappropriate. Instead, there were many reasons as to why countries might wish to develop indicators and any indicator should be developed specifically to fulfil those reasons.

It was considered important that the policy type indicators would need to be complemented by appropriate farmer decision making tools, so that risk reduction would be addressed at source.

4 Communication and use of indicators

The Group considered that the development and use of indicators should be linked with the assessment and registration of pesticides. The indicators should use, for example, the information about risks developed in the registration process and the information contained within the indicators should feed back into the regulatory activities and processes.

Some members of the Group believed that they would increasingly come under pressure to develop 'headline indicators' for political purposes. Such a use would place tension on the need to ensure that the indicators were developed from scientific foundations and the need to have an indicator which could be readily understood by the general public. The potential misuse of indicators in such circumstances was a matter of concern for the Group.

In the development and use of indicators, the Group considered that every effort should be made to ensure that the indicators had credibility. This could be achieved, as noted above, by engaging stakeholders early in their development. It would also be achieved by ensuring that the way in which the indicator had been developed, and the data used, could be assessed and verified by other interested parties (that is, the process for developing the indicator was transparent).

5 Continued appropriateness of the Copenhagen and York Principles

Overall, the Group felt that the Copenhagen principles were still relevant and that only very minor refinements were justified. These refinements related to ensuring that:

- the principles were applied in the context of the purpose for which the indicator was being developed;
- clear and consistent ways were developed for dealing with missing data;
- the importance of establishing the credibility of indicators was highlighted; and

- the establishment of a consistent understanding of terminology occurred at all levels, not just international.

The Group considered that the York principles were less useful mainly because of their high level of intent and associated lack of meaning. There was much discussion within the Group with respect to the meaning of analytical soundness (especially compared with scientific soundness) and measurability — the discussion remained unresolved.

Session 3: Next Steps for Aquatic Risk Indicators

The third breakout session addressed three questions:

1. is the proposed pilot project for using the aquatic risk indicators developed by the OECD a good idea;
2. is the draft pilot proposal as presented a good idea or should it be modified and how; and
3. should any of the indicators presented at this workshop be included in the pilot?

In discussing the “Proposal for a Project to Try Using the OECD Aquatic Risk Indicators” the Group considered it essential that such a project needed to be carried out as a cooperative project. It would not be possible for countries to do this independently of each other. The pilot would be carried out using the presently available data base for pesticide toxicity, fate and physico-chemical properties with the option for participating countries to add other pesticides to the data base. Data on pesticide use etc would have to be prepared on a national basis.

Participants would have the further option to try other national indicators presented at the Workshop. In addition to this it was suggested that there should be an option to incorporate ‘add-on’ modules (eg sediment), if desired, but not as a core part of the project.

In discussing the detailed project proposal, the Group suggested that OECD prepare an outline Purpose and Scope of the project, so that the project participants could consider this in their preparation for the meeting planned to start off the project and agree the full scope of the project.

Taking advice from a member of the Expert Group, who developed the aquatic indicator, the Group considered Step 4 of the proposal (training in the use of the computer programme) to be essential, since, at present, only the CSL consultant had run the programme. It was, however, pointed out that the fee for the training might prove to be a barrier to participation - as might be travel cost etc associated with the project. The Group suggested that the Working Group on Pesticides considered raising extra funds for the project.

The Group was doubtful about the estimated time required for the project. In fully scoping the project, the participants should develop their own timelines and not be concerned with planned meetings of the Working Group on Pesticides. In any case, the Group suggested that the project should report progress etc to the Risk Reduction Steering Committee of the Working Group on Pesticides in the first instance.

Concerning the final step (Step 6) of the proposal the Group discussed and agreed the following amendments/modifications:

- project participants to timetable Step 6 carefully
- there needs to be “time to think” and consider the results at national level including those from optional testing
- all results to be reported back on including from optional testing
- prepare interim report(s) so that the project remains visible
- prepare one integrated project report for the Risk Reduction Steering Committee, with Appendices covering individual participating countries contributions as appropriate.

Recommendations

The Group recommends that:

- the OECD Pesticide Programme should proceed with the aquatic risk indicator programme by carrying out the proposed pilot project taking into account the improvement suggestions made by the Group;
- the OECD consider establishing a fund for the project rather than rely on the resources of participating countries;
- the resource implications, both in terms of cash and staff cost/time, are more clearly and fully outlined;
- a user-friendly software is delivered to finish off the work of the Expert Group and be available for the start of the pilot project.

Session 4: Planning for Terrestrial and Health Risk Indicators

The fourth breakout session addressed three questions:

1. should the OECD Pesticide Programme initiate work on terrestrial and/or human health risk indicators;
2. if so, how and when; and
3. who would like to participate?

The Group’s discussion in response to these questions was assisted by the following proposed priorities presented by a Group member; these formed the basis of the Group’s considerations and recommendations.

- I. evaluate experiences made in the development and application of aquatic pesticide risk indicators;
- II. develop terrestrial risk indicators;
- III. implement post-registration procedures for the collection of relevant human data; and
- IV. develop human risk indicators for operators using relevant human data.

The Group’s discussion in response to the above is summarised below by key topics.

1 Further work on indicators

The Group was in strong agreement that any further work on indicators by the OECD should concentrate on aquatic risk indicators before starting work on other indicators. Given the investment in the aquatic risk indicators, it was important to ensure that all of the potential benefits from this work were realised before starting new work.

The Group noted that some countries have already developed, or were in the process of developing, other indicators. Such work was of interest to all member countries and should be encouraged. The Netherlands, for example, was ready to start developing terrestrial indicators.

The Group also noted that the state of readiness of member countries to develop terrestrial and human health indicators was not as well advanced compared with aquatic risk indicators. Nevertheless, if human health indicators were to be developed, operator exposure was likely to be the next aspect for which a risk indicator could be developed at the OECD level — there was already a lot of information available and a number of countries were interested in the development of such an indicator.

The Group concluded that work on terrestrial and human health risk indicators could proceed in parallel because the development of one was not dependent of the development of the other. They required different information and expertise to develop.

2 Post-registration activities

The Group considered in some detail the importance post-registration risk reduction and monitoring activities, with a number of countries outlining their activities in this area. Many of these activities were either just being developed or just implemented; worker exposure was an aspect of particular interest.

The activities included:

- adverse human health and environmental events reporting programs;
- more effective control of use activities;
- competency requirements for those using chemicals;
- education and training; and
- monitoring programs.

Some members of the Group considered that such activities were either more important than the development of indicators per se, or a necessary prerequisite to gain the information required for the development of terrestrial and human health indicators.

3 Recommendations

The Group concluded that it would be essential for the OECD to play an active role in the development of pesticide risk indicators and recommended that:

The OECD continue to facilitate and the collection and distribution of information on:

- indicators being developed by member countries;
- post registration risk reduction and monitoring activities, and

- education and training (including competency requirements).

Group 1 Participants

Chair: Anne Lindsay (United States)
Rapporteurs: Ray Jeffery (Australia),
Bernhard Johnen (GCPF)

Enrico Kiefer (EG*)
Dik van de Meent (EG*)
Bob Abel (United Kingdom)
Mikael Bjork (Sweden)
Jouni Rokkanen (Finland)
Jakob-Peter Hansen (Eurostat)
Thomas Moeller (Germany)
Fatima Rocha (Portugal)
Laure Souliac (France)

EG* = member of or consultant to the Expert Group for the
OECD Pesticide Aquatic Risk Indicators Project

Report of Group 2

Session 1: Application of the (OECD) Aquatic Risk Indicators

Some members of Group 2 were concerned about different indicators showing different trends. But having different indicators may also be an advantage to identify risks from different angles and it could be useful to combine them with other measures of environmental impact.

Therefore validation was considered to be an important issue but it was recognised that it could be difficult to compare indicators with nature. There are many different ways to possibly validate them. If countries test indicators in a pilot project, the collection of existing monitoring data should be encouraged which could be compared with indicators.

The following points were identified to be important when developing indicators:

- A pilot phase is needed to investigate the indicators.
- The indicators could be used as tools which facilitate communication within expert groups. They get experts within countries together to discuss a difficult topic. This discussion should include stakeholders and decision makers.
- The output should be simple to explain to politicians and the public. When choosing an indicator it would be most likely that people (politicians) will prefer the simplest.
- The projects indicators should be compared to simpler ones that have already been used because they may give the same answers. Indicators should include three main components, which are use, toxicity and fate.

The Group recognised that the lack of resources can be a barrier.

Some other thoughts of the Expert Group members were:

- REXTOX uses true values and therefore is perceived to be more real (and more linked to the use of pesticides).
- SYSCOR is a different way of thinking.
- Different uses of the indicators may need different levels of resources.
- In addition to indicators we need also to measure environmental impact.
- Indicators will show trends and can help to identify the methods to reduce risk in effective ways.
- Indicators are desired to assess post-registration risk management.
- Indicators are designed to look at the whole picture of changes in agricultural practices (but compliance with buffer zones will be difficult to determine).

Session 2: Guiding Principles for Developing and Using Risk Indicators

The Group stressed that there is a need to continually remind ourselves of the objectives of indicators (keeping in mind they are for political purposes). Terminology needs to be clearly defined.

There was a concern by some members of the Group that the use of indicators may be seen as contrary to the registration process. But during the registration process not all risks of pesticide application are taken into consideration and we need a post-registration tool for policy evaluation. Also, many compounds have not gone through the registration process (yet).

Simplicity has to be balanced against complexity. Only data which are important and essential should be included in the index calculations.

The guiding principles and criteria for indicators developed at Copenhagen were confirmed by the Group to stand up against a check. But it was recognised that there has to be a combination or aggregation of information in indicators at a certain level and that a good database is very important. Indicators should be used in conjunction with other information on pesticide use and risk.

Some other thoughts of the Expert Group members were:

- Indicators show only “potential” risk but not real risk. They should consider uncertainty (probability factor).
- There are differences in how components are combined in indicators and what input parameters are included. This gives different results but allows for cross checks.
- More simple indicators may miss some trends. But indicators like “area treated” or “frequency of treatments” could be a first step approach.
- Indicators need to be validated with monitoring data.
- Goals for “Risk-Reduction” programs of governments may be linked to indicators. They can be used to see if objectives have been reached. However the objectives may not make sense or may change and depend upon political decisions.
- Indicators have to be transparent so that results can be checked (we need to keep the layers of the onion).

Session 3: Next steps for Aquatic Risk Indicators

The Group members expressed a general interest to go ahead with a pilot project. They emphasised that the necessary modifications should be done before it starts but no more modifications should be made during the pilot phase. To avoid additional travelling there should preferably be just one training session.

The Group recommends that:

- Countries are interested to compare the OECD indicators with their own (or other) indicators and they should be able to do so.

- Common goals should be set to allow comparisons at the end of the pilot phase but they should not restrict countries to do their own testing. What should these common goals be?
- Each country in the pilot phase should keep track of the resources spent in order to help planing for the development of indicators in other areas.
- The participants of the pilot project should come back together at step 6 of the indicator trial proposal to discuss and compare their experiences and to make recommendations on further action.
- The pilot project could start as early as September 99 but should be flexible to allow countries to join in later.

Session 4: Planning for Terrestrial and Health Risk Indicators

The Expert Group agreed that there is a need to consider more aspects of the environment than just the aquatic compartment and hence that there is a need to have indicators for terrestrial and human health. However, time and resources were concerns, and it was agreed that only one project should be done at a time.

As a first task the project on aquatic indicators should be finished, but at the same time it would be useful if countries start thinking about human health and terrestrial indicators.

A first step should be to gather information about what work has already been done in indicator development in these areas.

It turned out that Canada and the Netherlands are working on bird indicators, Denmark has worked on terrestrial indicators, Norway has included terrestrial aspects in their indicator and Germany (Gutsche) has developed the “cake- concept”.

The Group felt that exposure would be much more difficult to tackle in developing terrestrial and human health indicators than it is the case with aquatic indicators.

With regard to development of terrestrial and human health indicators the following points should be considered:

- Before starting developing indicators the availability of data should be determined.
- A modular approach should be followed and the expertise already developed for aquatic indicators should be passed on.
- In the terrestrial area both direct and indirect effects should be considered.
- There is a need for more indicators for the terrestrial environment (e.g. birds, earthworms, bees).
- There may be a need for more than one indicator for human health (e.g. consumers, farm workers, bystanders).

It was agreed that a common database would be very helpful and it might be a task for OECD to co-ordinate such a project. Industry involvement should also be considered. The following questions (and probably many more) need to be addressed: - What elements will go into the database? - Who will take part? - How to screen the data?

Group 2 Participants

Chair: Roland von Arx (Switzerland)
Rapporteurs: Lene Graveson (Denmark),
Valerie Hodge (EG*)

Jean-Michel Jouany (EG*)
Miles Thomas (EG*)
Bas Drukker (European Commission, DG6)
Anders Emmerman (Sweden)
Marija Jamsek (Slovenia)
Kees Kloet (Netherlands)
Esa Nikunen (Finland)
Hitoshi Ono (Japan)
Bernd Stein (Germany)

EG* = member of or consultant to the Expert Group for the
OECD Pesticide Aquatic Risk Indicators Project

Report of Group 3

Session 1: Application of the Aquatic Risk Indicators

1. Questions to the members of the Expert Group on the risk indicators?

The Group asked the Expert Group members a number of clarifying questions on the indicator concepts, limitations, data requirements, etc.

The Expert Group members emphasised that none of the indicators should be considered to be above the others and indeed all were still far from being perfect. They also emphasised that all three indicators should be tested and used in parallel.

In order to apply the indicators, it is necessary to have comprehensive datasets covering:

- 1) pesticide properties, and
- 2) pesticide use.

The possibility of making the UK database on pesticide properties available to other countries was discussed, but it was stressed that even this database needs further development (filling of gaps, revising the parameters, etc.) before it could be used more widely. Other countries, such as the United States, also have databases on pesticide properties. It was suggested that these databases should be improved as soon as possible with, for example, the endpoints from EU evaluation of plant protection products.

2) What do you think of the indicators developed in the project?

The group agreed that development work done by the Expert Group was very important and of high quality. The work will also save time and money in Member countries as the work was now done by the Expert Group on their behalf. It was also agreed that there is clearly a demand for this kind of work to measure progress in risk reduction.

3) Barriers to applying the indicators.

The Group, however, hesitated to propose starting to use the indicators in their current form. The main barriers for implementing the indicators are:

- 1) It is unclear what is the relation of the indicators to actual risks in the real world. It is therefore very important to validate the indicators in order to know what they really measure.
- 2) Most countries do not have data on actual pesticide use. They often have sales data, but in some cases even sales data is confidential or not sufficiently detailed. It was also mentioned that many products are mixtures of active ingredients, in some countries over 50 % of products are used as mixtures. Surveys on pesticide use do not necessarily give an accurate picture as in the case of applying illegal pesticides or importing pesticides illegally.
- 3) Data on pesticide properties contains a lot of gaps. This problem could be solved by a concerted action at the international level.
- 4) There is the danger that if the indicators (in their current form) were applied they would be misused. Politicians might take action against substances that are driving forces in the

indicators, but where the substances are widely used yet only mildly toxic.

Retailers/manufacturers might misuse the indicators to promote their own products if they are not considered as "bad products" by the indicators. Journalists might misuse the indicators by presenting only the outcomes without first studying the reasons behind them or the limitations. This potential for misuse must be considered when presenting the results of the indicators to a non-expert audience.

- 5) The three indicators seem complex to use, understand and present. Simplified versions of these indicators would be preferred if these are feasible and robust. It was suggested that during the pilot testing, countries should test both the full and simplified versions of the indicators.

Session 2: Guiding principles for developing and using risk indicators

- 1) What do you think of the indicators presented?
- 2) What are the common experiences, problems and lessons learned in developing and using indicators?

There is a great variability among the indicators presented. Different indicators are developed for different purposes, hence they may show very different trends.

There is a lot of common elements: same input variables are used in most, but the way to combine these variables differs, hence there is a great variability in the outcomes.

All considered short term effects but only a few long term effects.

There is no scientifically valid way to combine the risk to terrestrial and aquatic environment, neither to combine environmental and human health risks. Weighing of different areas is a political process.

Indicator development is learning by doing process. Sharing of experiences among countries developing indicators is important, because we learn from the success and failures of others.

The process of developing indicators is important in many ways. It can, for example, improve links and contacts with the different agencies within and between countries.

There should be a clear link between the indicator and regulatory criteria, both should rank pesticides in a similar fashion, so that there is no danger of sending out mixed messages to policy makers.

Indicators are difficult to validate scientifically. Exposure is easier to validate than other factors. The group emphasised that there should be a close link between the indicator and the environmental impact.

Risk and use data must be combined in a way that does not lose track of the use component, hence the problem with indicators that are driven by pesticides that are widely used but only mildly toxic.

Indicators must respond to changes in policies, such as implementation of buffer zones, and to changes in pesticide products used, such as a shift to less toxic pesticides.

3) Reality check for the criteria

The group considered the indicator criteria to be valid and appropriate (e.g. aquatic and terrestrial risk indicators should be kept separate).

The proposed three indicators meet most of the Copenhagen criteria. However, more attention could be paid to criteria: „...indicators should be sound analytical tools with sophisticated inputs but with outputs that can be easily understood,.. Some members of the group find the outcomes of the currently proposed indicators difficult to understand. Some consideration might also be given to improve transparency and the use of post monitoring data if available.

Session 3: Next steps for Aquatic Risk Indicators

1) Is the proposed project (to try using the aquatic risk indicators developed in the OECD project) a good idea?

- Yes, the pilot project is a good idea and all three indicators should be tested.
- The timetable needs to give the countries more time to decide on their participation.
- There should be enough flexibility to allow countries to join the pilot phase at a later stage.
- There should also be flexibility in the degree of country involvement as countries could test the indicators with 1) their own sale/use data, 2) the Eurostat pesticide data (the possibility of using the comprehensive dataset purchased from the industry should be explored), and 3) the UK dataset.

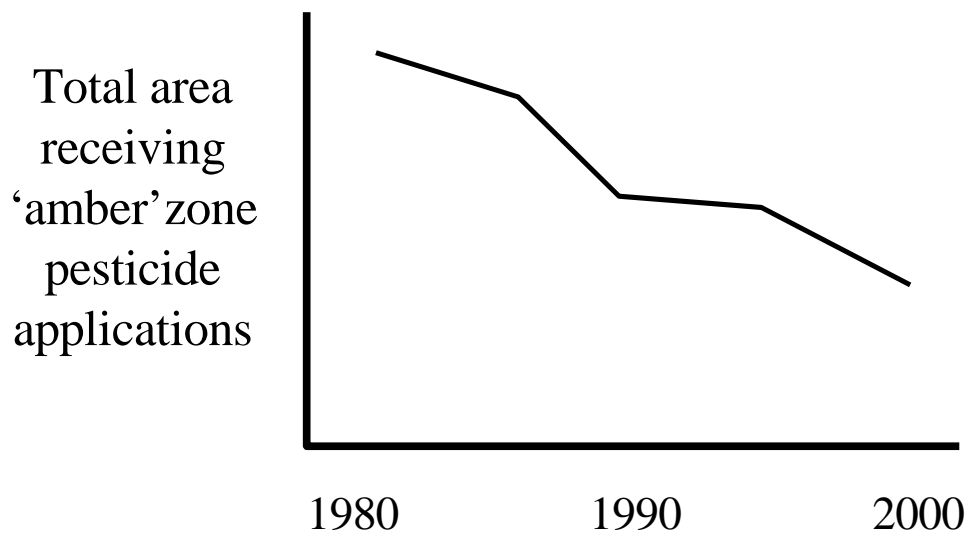
The pilot phase

1. The proposed OECD risk indicators should be tested, but minor modifications should be made to them first. Some aspects of the indicators could be easily improved. For example, the indicators are currently not responsive to dose rate which is a deficiency and could be corrected easily.
2. Simplified (or reduced) versions of these indicators should be tested alongside with the full versions in order to test for the robustness.
3. Countries that already have national indicators should continue to calculate these and compare the results with the OECD indicators.
4. Countries that want to test other national indicators (e.g. Switzerland might want to test the Danish and Swedish indicators) should be encouraged test those together with the OECD indicator set.
5. Countries with both sales and use data should try estimating use from sales with the method proposed by Germany.
6. New approaches which avoid the confusion between use and risk and have a solid link to regulatory process should be included in the pilot phase. The new approaches may just be new ways of presenting the existing indicators.

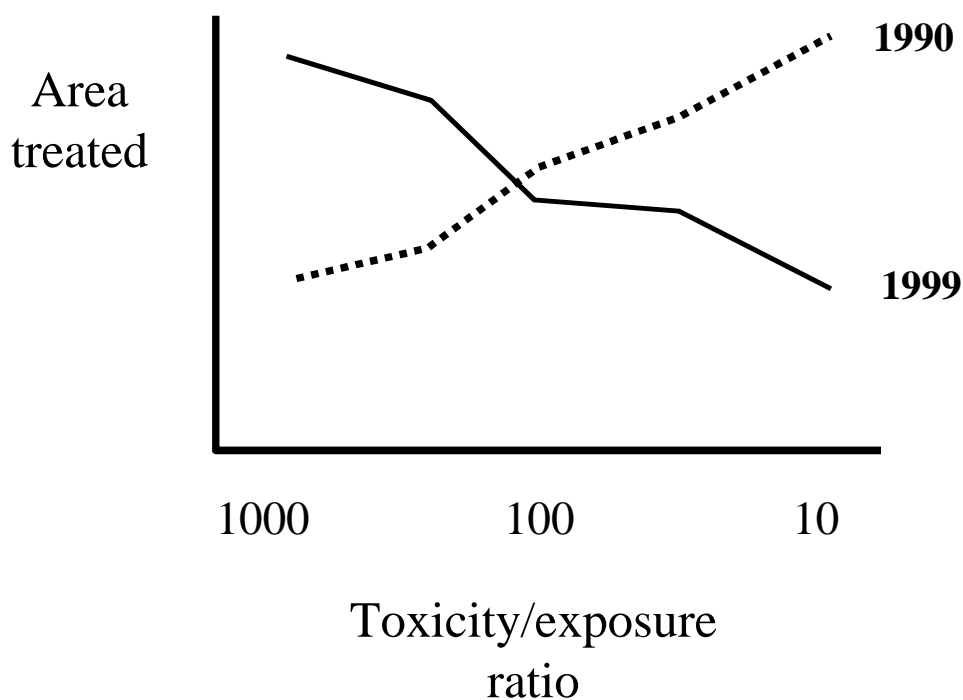
The new approaches

A new approach proposed by the group involves plotting the total area treated with pesticides against time. To do this, a country needs to divide all pesticides into three groups: those for which risk is considered clearly acceptable (green), those that it is concerned about (red) and

those that it is not sure of which category they belong to (amber). A graph would be drawn for each category red – amber – green and would show trends over time.



Another way of presenting the same idea would be to plot the area treated with pesticides against the toxicity exposure ratio. Here different graphs would be drawn to compare different years.



These new approaches have a number of advantages. They would be:

1. Consistent with risk assessment
2. Feedback to risk reduction
3. Combine risk and use without confusing them
4. Can take into account of higher tier data, hence avoids overstating risk

5. Would be flexible, modular, and might be suitable as a core approach
6. Can accommodate missing data easily.
7. The information required to apply these approaches is already in the system, hence the need for an extra effort is minimal.

The Expert Group should:

1. meet once more to discuss and decide on the additional indicators and the modifications to the current indicators to be included in the pilot phase;
2. help to develop a short guidance manual to accompany the user friendly version of the computer programme; and
3. be given an opportunity to get hands-on experience on running the computer programme as they will be providing technical support in the Member countries.

The additional work by the Expert Group will not delay the pilot phase as this work will be undertaken during the time that countries are converting their sales data to use data.

- 2) Is the proposal OK as it stands? Should it be modified? How?

Timetable must be revised as countries will need to consult with different agencies before committing to the pilot phase. The Expert group should give a cost estimate for testing the indicators in terms of how much work is needed to tailor the country specific parameters, etc.

- 3) Should any other indicators presented at this workshop be included in this trial?

See the answer above.

- 4) Volunteers for the pilot phase?

Several countries expressed interest to participate in the pilot phase in some way. See answer above.

Session 4: Planning for Terrestrial and Human Health Risk Indicators

Should work on terrestrial and/or human health risk indicators be initiated? If so, how and when? Who would like to participate?

Both areas are important but some considerations remain.

Considerations for the terrestrial indicator:

- Timing (resource implications)
- Data (endpoints/data on terrestrial organisms is not readily available)
- Methodology (how can data on birds, earthworms and bees be combined).
- Other on-going work (are/should other institutions be more actively involved, EU is currently writing a handbook for developing risk indicators).

The group welcomes work in this area and proposed that countries interested in developing indicators on terrestrial organisms should work together and present an extended outline to the OECD Working Group on Pesticides in February 2000.

Considerations for developing health indicators:

- Timing (resource implications)
- Data
- Focus (should the risk indicators be focused on the risk to farm operators or consumers?)
- Methodology (how can data be combined).
- Other on-going work (is the OECD the right place for this work, should the WHO be involved, etc.).

The group welcomed the papers and proposed that countries interested in developing indicators in this areas should work together and present an extended outline to the OECD Working Group on Pesticides in February 2000.

Group 3 Participants

Chair: Gunver Bennekov (Denmark)
Rapporteurs: Outi Honkatukia (OECD),
Gerold Wyrwal (FAO)

Volkmar Gutsche (EG*)
Andy Hart (EG*)
Takehiko Yokoyama (EG*)
Charles Barnard (United States)
Marc Fagot (France)
Jack Holland (Australia)
Sun Kwan Kim (Korea)
Jose Raul Ribeiro (Portugal)
Alfred Riggenbach (Switzerland)

EG* = member of or consultant to the Expert Group for the
OECD Pesticide Aquatic Risk Indicators Project

Report of Group 4

Session 1: Application of the Aquatic Risk Indicators

Before discussing the questions posed about the aquatic risk indicators, the purpose of risk indicators, to show national level trends in risk reduction over time with the ability to link to policy decisions, was restated.

What do we think about the aquatic risk indicators?

It was felt that the aquatic risk indicators were a good idea, useful and important because governments have expressed a need and or a requirement to measure progress in risk reduction as a result of risk reduction policies that have been put into place. In addition, the ability to have indicators that were more risk based than only using sales or use data (kilograms of product), was seen as an improvement.

However, the indicators were seen as complicated and hard to explain how they worked. They were also seen as requiring significant training in order to be able to use them as well as requiring the ability to communicate how they work in order to instill confidence in their ability to be useful. Also, it was felt that before using them, it would be important to understand more about what the indicators were responsive to, and what the level of uncertainty is, in order to know what the inputs need to be and what the results show.

A suggestion was made that a data base for the input parameters that could be shared by countries should be developed. It was also noted that the work to develop risk indicators provided the added benefit of forcing valuable thought in the area of risk assessment and risk management. Ensuring that indicators can be improved or accommodate new issues was also seen as important.

Can we use these indicators?

Although generally positive about the need for risk indicators, it was felt that before they can be reliably used, substantial work is needed. The issue of lack of input data, particularly pesticide properties, was a concern. Because of the complexity and the possible different results from different risk indicators there was a concern of misuse of results of the indicators. Therefore, the communication of the results is an important issue. An additional concern related to the potential loss of detail with a high level of aggregation, although it was recognized that at a national level indicator, a high level of aggregation is necessary.

Session 2: Guiding Principles for Developing and Using Risk Indicators

What do we think about the country indicators?

The country indicators have much in common, for example, the same goals, the same general range of data, the same problems with data gaps. A wide number of the indicators is a problem for policy makers because it suggests a lack of consensus on the approach for indicators and brings into question the validity of the use of indicators. There was general support for sharing data and the development of a standard core OECD approach, with

flexibility for incorporation and presentation of national issues, consideration of the possibility for regional harmonization, and with the ability to refine when circumstances change. One of the issues that was raised was that the relationship between trends from risk indicators that would be produced and the real risk to the aquatic environment is not necessarily known.

Given what was presented, the key issues to be considered when developing indicators include types of risks; the routes of exposure; the treatment of missing data; the use of scoring; the combination of exposure variables, of toxicity and exposure, and of risk and use; response to risk reduction measures, and level of aggregation required.

Principles and Criteria for Developing Indicators

- Policy relevant
- Science-based
- Based on reliable data
- Well defined terminology including how missing data is handled
- Appropriate levels of aggregation
- Understandable; transparent; consensual
- Flexibility, with a common core approach
- Awareness of limitations
- Separate indicators for environment and health

Session 3: Next steps for Aquatic Risk Indicators

There was general agreement that there should be a pilot project whereby countries participate in the use of all three indicators. If countries with additional indicators were interested that was also seen as useful. Key points made were that there needed to be enough time for countries to make a decision to participate (at least to end of September); that a clear understanding of the resources and costs needed was provided to countries, in the form of a revised proposal that would address the issue of confidentiality of data (that confidential data would not be shared); and that there was a mechanism for countries that would not participate in a pilot, to get the results of the pilot. In addition, there was interest to encourage monitoring as a way to validate the results of the risk indicators.

Session 4: Planning for Terrestrial and Health Risk Indicators

Planning for Terrestrial and Human Health Indicators

The priorities for future work , in the following order, are:

- Pilot the aquatic indicator
- Develop and test the terrestrial indicator
- Address the occupational human exposure indicator
- Address the general human population consumer risk indicator

The group agreed that the doing this work as soon as possible would be better, but because of resource concerns and as well to be able to see and use results from the aquatic risk indicator

pilot, the focus should be on this first. It was seen as important to raise the issue of proceeding with proposed work on the terrestrial risk indicator at the February 2000 Working Group on Pesticides.

Group 4 Participants

Chair: Wendy Sexsmith (Canada)

Rapporteurs: John Carley (EG*),
Mario Nichelatti (EG*)

Elisabeth Bosshard (Switzerland)

Marta Ciraj (Slovenia)

Tim Davis (United Kingdom)

Jan van Esch (Netherlands)

Ulla Falk (Sweden)

Herman Fontier (Belgium)

Jin Sup Shin (Korea)

Peter Sorensen (Denmark)

Erlend Spikkerud (Norway)

Wolfgang Zornbach (Germany)

EG* = member of or consultant to the Expert Group for the
OECD Pesticide Aquatic Risk Indicators Project

Annex 1

Workshop Participants

AUSTRALIA	
<p>HOLLAND, Jack S. Manager, Risk Assessment and Policy Section Environment Australia Administrative Building King Edward Terrace Parkes, ACT 2600 P.O. Box 787 Canberra City, ACT 2601 AUSTRALIA</p>	<p>Tel: 61 2 6274 1643 Fax: 61 2 6274 1610 E-mail: jack.holland@ea.gov.au</p>
<p>JEFFERY, Ray Assistant Secretary Dept. of Agriculture, Fisheries, & Forestry Chemicals and Biologicals Branch Food and Agribusiness Industries Div. Edmund Barton Building GPO Box 858 Canberra ACT 2601 AUSTRALIA</p>	<p>Tel: 61-2 6272 5686 Fax: 61-2 6272 5672 E-mail: ray.jeffery@affa.gov.au</p>
BELGIUM	
<p>FONTIER, Herman Ministère des Classes Moyennes et de l'Agriculture WTC 3, 8e étage Boulevard Simon Bolivar 30 B-1000 Bruxelles BELGIUM</p>	<p>Tel: 32-2 208 38 52 Fax: 32-2 208 38 66 E-mail: herman.fontier@cmlag.fgov.be</p>
CANADA	
<p>SEXSMITH, Wendy A. Health Canada Pest Management Regulatory Agency Alternative Strategies & Regulatory Affairs Sir Charles Tupper Bldg. Room D730, A/L 6607DI 2250 Riverside Drive Ottawa, Ontario K1A 0K9 CANADA</p>	<p>Tel: 1-613 736 3660 Fax: 1-613 736 3659 E-mail: WSexsmith@hc-sc.gc.ca</p>
DENMARK	
<p>BENNEKOU, Gunver Head Danish Environmental Protection Agency Pesticide Division Strandgade 29 DK-1401 Copenhagen K DENMARK</p>	<p>Tel: 45-32 66 0577 Fax: 45-32 66 0535 E-mail: gbe@mst.dk</p>

GRAVESEN, Lene Danish Environmental Protection Agency Strandgade 29 DK-1401 Copenhagen K DENMARK	Tel: 45-32 66 0573 Fax: 45-32 66 0535 E-mail: lgr@mst.dk
SORENSEN, Peter B. National Environment Research Institute Department of Env. Chem. Fredriksborgvej 399 Post Box 358 DK-4000 Roskilde DANEMARK	Tel: 45 46 30 18 17 Fax: 45 46 30 11 14 E-mail: pbs@dmu.dk
FINLAND	
ROKKANEN, Jouni Senior Officer Plant Production Inspection Centre Pesticide Division (Vilhonvuorenkatu 11 C) P.O. Box 42 FIN-00501 Helsinki FINLAND	Tel: 358-9 1342 1489 Fax: 358-9 1342 1421 E-mail: jouni.rokkanen@mmm.fi
NIKUNEN, Esa Division Manager Finnish Environment Institute P.O. Box 140 FIN-0025 Helsinki FINLAND	Tel: 358-9 403 00536 Fax: 358-9 403 00591 E-mail: esa.nikunen@vyh.fi
FRANCE	
FAGOT, Marc Ministère de l'aménagement du territoire et de l'environnement Direction de l'eau 20, avenue de Ségur 75302 Paris 07 SP FRANCE	Tel: 33-1 42 19 12 87 Fax: 33-1 42 19 12 93 E-mail: marc.fagot@environnement.gouv.fr
SOULIAC, Laure Ministère de l'agriculture et de la pêche et de l'alimentation DGAL/SPV 251 rue de Vaugirard 75015 Paris Cedex 15 FRANCE	Tel: 33-1 49 55 81 58 Fax: 33-1 49 55 59 49 E-mail: laure.souliac@agriculture.gouv.fr
GERMANY	
MOELLER, Tomas Bundesinstitut für Gesundheitlichen Verbraucherschutz und Veterinärmedizin Postfach 33 00 13 D-14191 Berlin GERMANY	Tel: 49 30 84120 Fax: 49 30 8412 4741 E-mail: t.moeller@bvgvv.de

<p>STEIN, Bernd Federal Environmental Agency Seecktstrasse 6-10 D-13581 Berlin GERMANY</p>	<p>Tel: 49-30 8903 3131 Fax: 49-30 8903 3138 E-mail: bernd.stein@uba.de</p>
<p>ZORNBACH, Wolfgang Federal Ministry of Food, Agriculture & Forestry Rochusstr. 1 D-53123 Bonn GERMANY</p>	<p>Tel: 49-228 529-4317 Fax: 49-228 529-4406 E-mail: tka4317@bml.bund400.de</p>
JAPAN	
<p>ONO, Hitoshi Coordinator Ministry of Agriculture, Forestry and Fisheries Agricultural Chemicals Inspection Station 2-772 Suzuki-Cho, Kodaira-shi Tokyo 187-0011 JAPAN</p>	<p>Tel: 81 423 83 2151 Fax: 81 423 85 3361 E-mail: WR3H-ON@asahi-net.or.jp</p>
KOREA	
<p>KIM, Sun Kwan NIAST Rural Development Administration 249 Seodun-dong Suweon 441-707 KOREA</p>	<p>Tel: 82 331 290 0238 Fax: 82 331 290 0222 E-mail: sukkim@niast.go.kr</p>
<p>SHIN, Jin Sup NIAST, Rural Development Administration 249 Seodun-dong Suweon 441-707 KOREA</p>	<p>Tel: 82 331 290 0518 Fax: 82 331 290 0521 E-mail: shinjs@niast.go.kr</p>
THE NETHERLANDS	
<p>KLOET, Kees J. Ministry of Agriculture, Nature Management and Fisheries Galvanistraat 7 P.O. Box 482 6710 BL Ede THE NETHERLANDS</p>	<p>Tel: 31 318 671474 Fax: 31 318 624 737 E-mail: c.j.kloet@ikclb.agro.nl</p>
<p>VAN ESCH, Jan Ministry of Agriculture, Nature Management & Fisheries Department of Agriculture Galvanistraat 7 P.O. Box 482 6710 BL Ede THE NETHERLANDS</p>	<p>Tel: 31-318 671430 Fax: 31-318 624737 E-mail: j.w.j.van.esch@ikclb.agro.nl</p>

NORWAY	
SPIKKERUD, Erlend Norwegian Agricultural Inspection Service P.O. Box 3 N-1403 AS NORWAY	Tel: 47 64 94 4400 Fax: 47 64 94 4410 E-mail: erlend.spikkerud@slt.dep.no
PORTUGAL	
RIBEIRO, José Raul Direcção-Geral de Protecção das Culturas Tapada da Ajuda - Edifício 1 1349-018 Lisboa PORTUGAL	Tel: 351 1 363 4054 Fax: 351 1 363 5016 E-mail: dgpc.fitosan@mail.telepac.pt
ROCHA, Fátima Direcção-Geral de Protecção das Culturas Quinta do Marquês 2780 Oeiras PORTUGAL	Tel: 351 1 441 2822 Fax: 351 1 442 0616 E-mail: dgpc.pest@mail.telepac.pt
SLOVENIA	
CIRAJ, Marta State Undersecretary Ministry of Health Dept. for Environmental Health & Safety Stefanova 5 SI-1000 Ljubljana SLOVENIA	Tel: 386-61 178 6250 Fax: 386-61 123 1781 E-mail: marta.ciraj@mz.gov.si
JAMSEK, Marija Poison Controlle Centre University Medical Centre Zaloska 7 1525 Ljubljana SLOVENIA	Tel: 386 61 302 457 Fax: 386 61 302 456 E-mail: marija.jamsek@kclj.si
SWEDEN	
BJÖRK, Mikael Chemicals Inspectorate Box 1384 S-17127 Solna SWEDEN	Tel: 46 8 730 6250 Fax: 46 8 735 7698 E-mail: mikaelb@kemi.se
EMMERMAN, Anders Agronomist Swedish Board for Agriculture Div. for Plant Husbandry S-551 82 Jönköping SWEDEN	Tel: 46-36 155 154 Fax: 46-36 710 517 E-mail: anders.emmerman@sjv.se
FALK, Ulla Chemicals Inspectorate Box 1384 S-17127 Solna SWEDEN	Tel: 46 8 730 6827 Fax: 46 8 735 7698 E-mail: ullaf@kemi.se

SWITZERLAND	
BOSSHARD, Elisabeth Federal Office of Agriculture Mattenhofstrasse 5 CH-3003 Bern SWITZERLAND	Tel: 41-31 324 9080 Fax: 41-31 825 0476 E-mail:
RIGGENBACH, Alfred Swiss Federal Office of Agriculture Section Plant Protection Products Mattenhofstrasse 5 CH-3003 Bern SWITZERLAND	Tel: 41-31 322 2625 Fax: 41-31 322 2634 E-mail:
VON ARX, Roland Swiss Agency for the Environment, Forests & Landscape Div. Substance, Soil, Biotechnology CH-3003 Berne SWITZERLAND	Tel: 41-31 322 9337 Fax: 41-31 324 7978 E-mail: roland.vonarx@buwal.admin.ch
UNITED KINGDOM	
ABEL, Robert Department of the Environment, Transport and the Regions Chemicals & Biotechnology Div. 3/E4, Ashdown House 123 Victoria Street London, SW1E 6DE UNITED KINGDOM	Tel: 44 171 890 5244 Fax: 44 171 890 5229 E-mail:
DAVIS, Tim J. Pesticides Safety Directorate Environment & Residues Policy Branch Room 310 Mallard House, Kings Pool 3 Peasholme Green York YO1 7PX UNITED KINGDOM	Tel: 44-1904 455 752 Fax: 44-1904 455 733 E-mail: t.j.davis@psd.maff.gov.uk
UNITED STATES	
BARNARD, Charles Agricultural Economist US DA Economic Research Service Room 4084 1800 M St. N.W. Washington, D.C. 20036-5831 UNITED STATES	Tel: 1 202 694 5600 Fax: 1 202 694 5756 E-mail: cbarnard@econ.ag.gov
LINDSAY, Anne Chairwoman, Pesticide Forum Environmental Protection Agency Office of Pesticide Programs (7506-C) Director, Field and External Affairs 401 M Street SW Washington, D.C. 20460 UNITED STATES	Tel: 1-703 305 5265 Fax: 1-703 305 6244 E-mail: lindsay.anne@epa.gov

EUROPEAN COMMISSION	
<p>DRUKKER, Bas European Commission DG 6 B II 1 Rue de la Loi 200 (L86/1/8) 1049 Bruxelles BELGIQUE</p>	<p>Tel: 32 2 2965779 Fax: 32 2 2965963 E-mail: Bas.Drukker@dg6.cec.be</p>
FAO	
<p>WYRWAL, Gerold Agricultural Officer Food & Agriculture Organization Plant Production & Protection Division Viale delle Terme di Caracalla I-00100 Rome ITALY - FAO</p>	<p>Tel: 39-06 5705 2753 Fax: 39-06 5705 6347 E-mail: Gerold.Wyrwal@fao.org</p>
EUROSTAT	
<p>HANSEN, Jakob-Peter Eurostat F-3 Jean-Monnet Building Office BECH - B4/447 L - 2920 LUXEMBOURG [EUROSTAT]</p>	<p>Tel: 352 4301 35271 Fax: 352 4301 37316 E-mail: jakob-peter.hansen@eurostat.cec.be</p>
GCPF	
<p>JOHNEN, Bernhard Stewardship Manager ZENECA Agrochemicals Fernhurst Haslemere Surrey GU27 3JE UNITED KINGDOM [GCPF]</p>	<p>Tel: 44-1428 65 5995 Fax: 44-1428 65 7130 E-mail: bernhard.johnen@aguk.zeneca.com</p>
EXPERT GROUP	
<p>KOEPP, Herbert, Chairman Federal Biological Research Centre for Agriculture and Forestry Messeweg 11/12 D-38104 Braunschweig GERMANY</p>	<p>Tel: 49-531 299 3456 Fax: 49-531 299 3003 E-mail:h.koepp@bba.de</p>
<p>CARLEY, John Environmental Protection Agency (7501-C) 401 M Street S.W. Washington, D.C. 20460 UNITED STATES</p>	<p>Tel: 1-703 305 7019 Fax: 1-703 305 5060 or 1-703 305 5233 E-mail:carley.john@epa.gov</p>
<p>GUTSCHE, Volkmar Biologische Bundesanstalt für Land und Forstwirtschaft Institut für Folgenabschätzung im Pflanzenschutz (FP) Stahnsdorfer Damm 81 D-14532 Kleinmachnow GERMANY</p>	<p>Tel: 49-332 03 48 2 65 Fax: 49-332 03 4 84 24 E-mail:v.gutsche@bba.de</p>

<p>HODGE, Valerie Pest Management Regulatory Agency Sir Charles Tupper Bldg 2250 Riverside Drive Ottawa, Ontario K1A 0K9 CANADA</p>	<p>Tel: 1-613 736 3719 Fax: 1-613 736 3710 E-mail: vhodge@pmra-arla.hc-sc.gc.ca</p>
<p>JOUANY, Jean-Michel Professeur Faculte Medecine et Pharmacie Toxicologie & Ecotoxicologie 4 avenue Carnot 91370 Verrieres-le-Buisson FRANCE</p>	<p>Tel: 33-1 69 20 15 98 Fax: 33-1 69 20 15 98 E-mail: jmjouany@clubinternet.fr</p>
<p>KIEFER, Enrico Novartis Crop Protection Ltd. Environmental Safety Assessment P.O. Box R-1058.7.00 CH-4002 Basle SWITZERLAND</p>	<p>Tel: 41-61 697 68 74 Fax: 41-61 697 49 66 E-mail: enrico.kiefer@cp.novartis.com</p>
<p>NICHELATTI, Mario Ecotoxicologue Ministère de l'aménagement du territoire et de l'environnement Sous Direction Produits & Déchets Dir. de la Prev. Pollution et Risques 20 avenue de Ségur 75302 Paris 07 SP FRANCE</p>	<p>Tel: 33-1 42 19 15 45 Fax: 33-1 42 19 14 68 E-mail: mario.nichelatti@environnement.gouv.fr</p>
<p>VAN DE MEENT, Dik RIVM Lab Ecotoxicology PO Box 1 NL-3720 BA Bilthoven THE NETHERLANDS</p>	<p>Tel: 31-30 274 3130 Fax: 31-30 274 4413 E-mail: d.van.de.meent@rivm.nl</p>
<p>YOKOYAMA, Takehiko Officer, Planning and Coordination Section Ministry of Agriculture, Forestry and Fisheries First Inspection Division Agricultural Chemicals Inspection Station 2-772 Suzuki-Cho, Kodaira-shi Tokyo 187 JAPAN</p>	<p>Tel: 81-423 83 2151 Fax: 81-423 85 3361 E-mail: hx8t-ykym@asahi-net.or.jp</p>

CONSULTANTS	
HART, Andy MAFF Central Science Laboratory Sand Hutton York YO41 1LZ UNITED KINGDOM	Tel: 44 1904 462 053 Fax: 44-1904 462 111 E-mail: a.hart@csl.gov.uk
THOMAS, Miles R. MAFF Central Science Laboratory Pesticide Usage Survey Group Sand Hutton York YO41 1LZ UNITED KINGDOM	Tel: 44-1904 462 410 Fax: 44-1904 462 253 E-mail: M.thomas@csl.gov.uk
OECD SECRETARIAT	
HONKATUKIA, Outi OECD AGR/CSE FRANCE	Tel: 33-1 45 24 79 64 Fax: 33-1 44 30 61 02 E-mail: outi.honkatukia@oecd.org
RICHARDS, Jeanne OECD ENV/EHS FRANCE	Tel: 33-1 45 24 89 45 Fax: 33-1 45 24 16 75 E-mail: jeanne.richards@oecd.org