

## **DAC GUIDELINES ON AID AND ENVIRONMENT**

The OECD Development Assistance Committee (DAC) seeks to improve and co-ordinate Member policies which will integrate development and environment imperatives. Through its Working Party on Development Assistance and Environment, the DAC is preparing a series of Guidelines and Recommendations on Aid and Environment. These Guidelines are designed to help policy-makers as well as practitioners in donor agencies and developing countries devise strategies to address serious national, regional and international environmental concerns.

In December 1991, OECD Ministers of Environment and Development Co-operation endorsed the first set of guidelines adopted by the DAC:

1. *Good Practices for Environmental Impact Assessment of Development Projects;*
2. *Good Practices for Country Environmental Surveys and Strategies;*
3. *Guidelines for Aid Agencies on Involuntary Displacement and Resettlement in Development Projects;*
4. *Guidelines for Aid Agencies on Global Environment Problems;*

In 1993, the DAC adopted the *Guidelines No. 5 on Chemicals Management*, and in 1994 the *Guidelines No. 7 on Disaster Mitigation*.

The sixth in the series is the *Guidelines for Aid Agencies on Pest and Pesticide Management*. It provides an overview of the current situation concerning pest and pesticide management in developing countries and identifies three priority areas for development assistance in this field: promoting the development and application of integrated pest management (IPM); strengthening of pesticide management capabilities in recipient countries; ensuring good practices when providing pesticides under aid programmes. Each of these three areas is subsequently worked out in more detailed policy guidelines.

The Guidelines are only one aspect of the DAC activities which bear on sustainable development. Current activities include the development of guidelines on wetlands management, as well as on the global and regional aspects of marine pollution; capacity development in the field of environment; coherence in environmental assessment; technology transfer and co-operation; trade, environment and development co-operation.



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## **Abbreviations and Acronyms**

DAC	Development Assistance Committee of OECD
EC	European Commission
FAO	Food and Agriculture Organisation of the United Nations
GIFAP	International Group of National Associations of Agrochemical Manufacturers
GLOBE	Global Legislators Organisation for a Balanced Environment
ILO	International Labour Organisation of the United Nations
IPCS	International Programme on Chemical Safety
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
IVC	Integrated Vector Control
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
PAN	Pesticide Action Network
PIC	Prior Informed Consent
TCDC	Technical Co-operation among Developing Countries
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNITAR	United Nations Institute for Training and Research
USAID	United States Agency for International Development
WHO	World Health Organisation of the United Nations

## **GUIDELINES ON PEST AND PESTICIDE MANAGEMENT**

### **I. Introduction**

Over the last decades, the use of pesticides in developing countries has rapidly increased, while the development and introduction of instruments to control their use and distribution has lagged behind. In many countries this has led to widespread occurrence of undesirable practices affecting public health and the environment. National and international concern about this situation, the broad involvement of aid agencies in pest control programmes, and the new perspectives on pest control provided by growing experience with and recent successes of the concept of integrated pest management (IPM), formed the reason for the OECD/DAC to prepare these guidelines.

The guidelines aim to provide a common frame of reference to OECD aid agencies for the formulation of their aid policies on pest and pesticide management, and for the assessment and evaluation of their current activities in this field. They are primarily intended for use by policy-makers, managers and operational and project staff in aid agencies, although much of the information may also be of interest to others, including international organisations, recipient governments and non-governmental organisations (NGOs).

As these guidelines are policy-oriented, they do not contain comprehensive technical information on pest control methods and pesticides, nor do they provide safety instructions for distributors or users. Some further policy-related background information is provided in Annex 1 (IPM) and Annex 2 (pesticide management). Annex 3 provides further references for both policy-oriented and technical information.

Separate OECD/DAC guidelines have been prepared on the manufacture, trade, handling, use and disposal of chemicals in general. (See the DAC Guidelines on Aid and Environment No 5: *Guidelines for Aid Agencies on Chemicals Management*, OECD, Paris 1993.)

## **II. Current Situation**

### ***Pesticide use in developing countries***

Pest control is vital to agricultural production. Pre- and post-harvest losses (\*) caused by pests may vary widely depending on crop, species, climatic and other factors. Pests affecting animal health also cause heavy losses and in many areas prevent livestock development. However, these pests as well as pest-caused pre- and post-harvest losses require different approaches. Pest control has therefore become an important element in strategies to increase or sustain agricultural outputs in order to provide food security for the steadily growing population of developing countries. Effective pest control is also necessary to achieve a stable increase in production of export crops, which, for many developing economies, is the main source of hard currency.

Among the available pest control methods, the use of pesticides has become a major method throughout the world. The global end-user agrochemical market is valued around \$25 billion a year. Companies which have their headquarters in OECD Member countries annually supply pesticides to developing countries worth \$5-5.5 billion<sup>1</sup>, about 20 per cent of the world market. In developing countries, pesticides are used mainly for crop protection, but also for vector control in public health programmes and animal health programmes. In Africa, the Near East and Asia, large quantities have been, and are being, used for locust control emergency operations.

Developing countries normally import pesticides as ready to use formulations or formulate them locally on the basis of imported active ingredients. Only a few developing countries (e.g. China and India) manufacture active ingredients. Pesticides used in government programmes are either purchased from government budgets, or are received as donations. Development banks sometimes provide loans to governments for the procurement of pesticides. Reliance on donations varies strongly from country to country and seems heaviest in Sub-Saharan Africa. Besides the public sector, most countries have a well-established private agrochemical sector supplying directly and indirectly to users. Under structural adjustment programmes, the role of the private sector in pesticide supply can be expected to increase.

A large-scale introduction of IPM is expected to lead to a sizeable decrease of insecticides and fungicides used in crop protection without affecting the long-term sustainability of yields. Examples are available for rice, cotton, banana, cassava, oil palm and other crops. Similar achievements have been made by the introduction of integrated vector control (IVC) in animal health programmes. In several countries, large-scale aerial or ground spraying against tsetse flies has been successfully replaced by combinations of the use of traps, sterile male release and treatment of cattle. Whether IPM and IVC will lead to an actual reduction of the overall pesticide use in developing countries, still remains to be seen. Reductions in

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\* Losses shall be defined as the difference in net income between current practice and its next best alternative for crop production.

certain sectors may be counteracted by increases in other sectors. Trends, for instance, indicate a rise in the use of herbicides as labour costs increase as a result of industrialisation. For the near future, the intensive use of insecticides is expected to continue for a variety of specific purposes, such as migratory pest control, for which effective non-chemical alternatives are still not available.

### ***Side-effects of pesticide use***

Pesticides play an important role in protecting crops and agricultural products against damage caused by pests and diseases, but their use often also causes a variety of undesirable side-effects, in particular on human health and the environment. In a growing number of cases, pesticides are also losing their effectiveness thus becoming increasingly unsustainable and cost-ineffective<sup>2</sup>.

An estimated 25 million farmers and agricultural workers in developing countries suffer pesticide poisoning each year<sup>3</sup>. The main causes are:

- easy access to pesticides unsuitable for use by small-scale farmers;
- wide availability of pesticides of which the use has been banned or restricted in OECD countries for health reasons;
- general ignorance about pesticides (small-scale farmers, both men and women, are often not able to distinguish between different products, are generally not aware of hazards connected with the handling and use of pesticides, often use them in an excessive and inappropriate fashion and are not aware of alternative pest control methods);
- lack of protective clothing and/or appropriate application equipment (even when appropriate clothing and application equipment are locally available, most small-scale farmers will not use them because they can not afford the investment);
- frequent missing of labels with complete instructions on the handling, use and disposal of the product;
- unsafe re-packaging of pesticides by unauthorised retailers;
- lack of medical knowledge for the treatment of people affected by poisonous chemicals.

Many farmers and plantation workers seem to adopt a fatalistic attitude and accept suffering minor poisoning symptoms for a short period of time as a natural consequence of crop protection activities. Antidotes are often not available at rural health posts.

Public health is adversely affected through gradually increasing contamination of the environment and through direct intake of pesticide residues with food and water. Common practices contributing to an intake of pesticide residues include: non-observance of prescribed minimum intervals between the last pesticide application and harvesting; the use of inappropriate and persistent pesticides (e.g. organo-chlorine compounds) on food crops; the re-use of empty pesticide containers for storage of food or water; feeding of contaminated crops to

livestock resulting in high residue levels in milk and meat. This can cause acute and gradual poisoning.

Excessive and injudicious use of pesticides has in many places led to widespread environmental contamination affecting fauna, flora and ecosystems and contributes to reducing bio-diversity. Inappropriate disposal practices and leakage as a result of inappropriate transport and storage, have, at various locations, caused dangerous levels of soil and water contamination. Environmental contamination has also negative economic effects on enterprises such as prawn and fish farms, fresh water fisheries, fishery in coastal areas, honey production and the export of frogs, as well as decreased agricultural production resulting from reduced soil fertility (poisoning of worms and micro-organisms) and reduced pollination (poisoning of bees).

Monitoring of residue levels on agricultural products is often confined to export commodities in order to ensure that these meet the residue tolerance standards of the importing country. Strict enforcement of such standards by importing countries has put pressure on exporting countries to improve pest control practices in order not to lose foreign markets. Residue levels on products for local markets are generally not monitored routinely.

The ecological balance in many agricultural production areas has been destroyed, in particular as a result of agricultural intensification programmes, which involved mono-cultures and heavy reliance on fertilisers and pesticides. Intensive use of pesticides severely disrupted populations of natural enemies of pests. This accelerated the resurgence of original pest populations and induced the development of secondary pests. Combined with increased pesticide resistance among pest populations, this led to crisis situations in which more and more use of the same or several pesticides was unable to prevent a decline in production. In several countries, such crisis situations have had major negative economic consequences<sup>4</sup>.

Another problem is caused by large quantities of pesticides which have become obsolete while being kept in store. They can no longer be used because they have deteriorated or because their use is no longer permitted for environmental or health reasons. At many locations, such stocks have started to leak and are causing severe environmental contamination. A substantial part of these obsolete pesticides are old strategic stocks for locust control. In many African countries, the major part of the obsolete pesticide stocks are left-overs of pesticide donations provided under aid programmes<sup>5</sup>.

Uncleaned empty pesticide drums should generally be regarded as hazardous waste. Government plant protection services using large quantities of pesticides (e.g. for locust control) often do not have devices to clean and crush empty drums. Instead, empty drums are left to corrode at their premises. Apart from the immediate environmental risk, storing such drums also increases the risk that they enter into public circulation and are used for purposes which constitute imminent health hazards.

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### ***Pesticide management capabilities in recipient countries***

Not all developing countries do yet have pesticide legislation, and those who do have such legislation are often not able to enforce it effectively because of gaps in expertise required for the functioning of a registration scheme, inadequate laboratory facilities and lack of trained inspectors. In some countries, regulating pesticides is still not considered an important issue in national planning and therefore does not receive the required policy attention, including allocation of staff and funds.

Countries which do not have pesticide legislation, sometimes have a different mechanism to control the official importation of pesticides. This is often a system in which clearance of the type and quantity of pesticides is required by the Ministry of Agriculture, as a condition for obtaining an import permit from the authorities, which control the import of commodities purchased with hard currency.

Government control is often inadequate. Many countries do not have a licensing system for pesticide retailers. Unauthorised re-packaging of pesticides is a common practice and often these pesticides are sold without appropriate labels. Transport, storage, distribution, use and disposal are often unsafe and constitute a direct hazard to human life and the environment.

Government storage facilities for bulk quantities of pesticides are often inadequate. Many stores lack concrete floors and/or sufficient ventilation. In some countries, part of the stock is stored in the open. Poor storage accelerates the deterioration of pesticides and contributes to the accumulation of obsolete stocks. Uncertainty about the quality of existing stocks complicates the planning of national pesticide requirements.

In general, developing countries do not have appropriate facilities for the safe and environmentally sound disposal of obsolete pesticides. Attempts to bury obsolete stocks have caused serious environmental contamination. (For further background information on pesticide management, see Annex 2.)

### ***Integrated pest management***

IPM is an approach to pest control which aims to maintain pest damage below economically unacceptable levels by using natural control methods as much as possible. Pesticides should be used judiciously and selectively when other economically viable alternatives do not exist or are not accessible. FAO has defined IPM as: *“a pest management system that in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest population at levels below those causing economically unacceptable damage or loss”*.

Successful IPM programmes depend on an understanding of pest populations, the associated ecosystem and the available management tactics. To a large extent, IPM is site specific. Therefore IPM strategies must be tailored to specific crop/pest complexes in particular locations.

IPM, as an approach to plant protection, is rapidly gaining ground in both industrialised and developing countries. In several sectors it has resulted in major reductions in pesticide use. In industrialised countries, its introduction has been accelerated by government policies aimed at reducing environmental contamination caused by pesticides and by pressure from environmental and consumer groups. In many developing countries, IPM programmes have been initiated in response to crisis situations in pest control and resulted in significant reductions of pesticide use, while yields recovered. Examples of IPM breaking pest control crisis situations in developing countries are available mainly for rice, cotton, oil palm, cabbage, as well as other crops<sup>6</sup>.

During two decades of experience, IPM has evolved into a mature approach to pest control, suitable for both small and large scale implementation in developing countries. The most prominent example of a successful large scale IPM programme is that of IPM in rice production in Asia. Over half a million rice farmers in Asia are now applying IPM techniques in their fields. On an average the number of pesticide application among this group was 50 per cent less than those of farmers not trained in IPM, while a yield increase was achieved of 5 per cent per hectare<sup>7</sup>. Other examples include cotton production in Latin America and cassava production in Africa.

Recent IPM programmes in developing countries are based on creating an understanding among farmers (both men and women) of the ecology of their crops, the pests and the natural enemies of the pests. After a sequence of regular training sessions throughout the season, farmers are able to understand what is happening in their fields and to make their own decisions concerning control actions. This approach proves more effective than previous approaches in which extension staff prescribed for farmers what to do when a certain pest occurred.

The large scale introduction of IPM in crop protection has been hampered by the common misunderstanding that IPM is too complicated for small-scale farmers and that IPM is not ready for large-scale implementation because more research is required. The Asian experience demonstrates that it is possible to train large numbers of small-scale farmers in IPM. With regard to research it is often overlooked that IPM field research results are available for many crops, but that these have often been given insufficient follow-up into farmers' field practice. In many cases it will be possible to formulate simple IPM strategies on the basis of the available information. The strategy can then be further developed and refined through applied research after implementation has started.

One obstacle for the large scale introduction of IPM are subsidised pesticides. Many governments, for example, subsidise pesticides to make them more accessible to farmers who normally do not have adequate working capital to purchase inputs. Such subsidies can take the form of:

- provision of pesticides free of charge or at prices below the purchasing price;
- lower taxes and tariffs for the importation of agricultural inputs including pesticides;
- subsidies in the form of non-price factors;

- realistic transport, storage and distribution costs of pesticides are not reflected in the price because these activities are part of government programmes to promote the agricultural sector.

Subsidies may be applicable to all pesticides or may be confined to pesticides for a certain sector or target group. Free or subsidised pesticides often lead to overuse and misuse of pesticides and form a major disincentive against IPM because they distort the comparison of production costs of chemical-oriented and non-chemical-oriented production systems.

Among aid agencies there seems to be a growing consensus that pesticides should not be subsidised. Concern has been expressed about developments in some Sahelian countries, where the locust threat has become an excuse for regular donations of large quantities of pesticides, which are then distributed as free or subsidised pesticides under the countries' regular plant protection programmes<sup>8</sup>.

Presently, in many developing countries, problems with pesticides receive much attention in the media and through awareness programmes conducted by NGOs. For most governments, pesticides are now on the political agenda. Many policy-makers view IPM as a new, and interesting concept, which deserves a chance in a bid to address the ubiquitous problems caused by excessive and injudicious use of pesticides. In several Asian countries, policy-makers are giving full support to IPM programmes after they have seen the impact of the IPM rice programme. However, support to the introduction of IPM seems to focus on agricultural production systems which have reached the crisis stage. The introduction of IPM in systems which have not yet reached this stage, often receives less priority.

The introduction of IPM should be regarded as an investment towards more sustainable agricultural production systems, reduced hazards for people and the environment, and a considerable reduction of costs of pest control (including hard currency, savings) compared with a continued sole reliance on pesticides. An investment in IPM offers a long-term solution, while the mere provision and use of pesticides would only achieve a temporary effect. (For further background information on IPM, see Annex 1.)

### ***The role of aid agencies***

Aid agencies are involved in pest control in various ways. These include pesticides donations, as well as support to IPM activities and assistance to strengthen pesticide management capabilities in recipient countries. A few agencies have responded to requests for assistance in the disposal of obsolete pesticide stocks.

All major aid agencies are providing pesticides either in kind or through aid often tied in the form of grants or soft loans. The main destinations are: emergency operations to control locust outbreaks; agricultural projects executed or funded by the aid agency; government programmes to promote specific agricultural sectors; government public health programmes; government animal health programmes.

Another mechanism to provide pesticides is balance of payments support used for the purchase of pesticides and other agricultural inputs.

In the past, there have regularly been problems with pesticides provided by aid agencies. Many of these problems could have been avoided if more care had been taken in the selection of products. Examples of mistakes made by aid agencies have included:

- product not registered in the recipient country;
- product not evaluated in the donor or in any other OECD country;
- product ineffective for the intended use;
- formulation not stable under tropical conditions;
- formulation not suitable for the available application equipment;
- quantities provided far in excess of actual requirements;
- product too dangerous for untrained users;
- labels missing or in a language alien to the users;
- containers of inappropriate size and therefore inviting dangerous re-packaging practices;
- containers not durable enough for use under tropical conditions.

Such mistakes commonly lead either to pesticides remaining unused and becoming obsolete, or to dangerous improvisations posing unnecessary hazards to users and causing unnecessary environmental contamination.

All donor governments have agreed to comply with the FAO Code of Conduct on the Distribution and Use of Pesticides as a general guideline for assistance involving pesticide donations. A start has been made with the implementation of the Prior Informed Consent (PIC) scheme as requested in article 9 of the Code of Conduct (for details concerning the Code of Conduct and PIC, reference is made to Annex 2).

The focus on IPM has been strengthened by the United Nations Conference on Environment and Development (UNCED). Agenda 21 underlines the importance of IPM as the most practical response to concerns about pesticides in agricultural intensification. IPM is regarded as the best pest control option for the future, as it guarantees yields, reduces costs, is environmentally friendly and contributes to the sustainability of agriculture. The section *Integrated Pest Management and Control in Agriculture* (Chapter 14, Section I of Agenda 21) calls for: a) strengthening of plant protection and animal health services, including mechanisms to control the distribution and use of pesticides, and to implement the International Code of Conduct on the Distribution and Use of Pesticides; b) programmes to put IPM practices within reach of farmers; c) establishment of interactive networks among farmers, researchers and extension services to promote and develop IPM.

Several aid agencies have formulated specific policies on pest control and the provision of pesticides under their aid programmes<sup>9</sup>, or have included a chapter on pesticides in their environmental orientations for development co-operation. Under certain circumstances, others have been able to demonstrate the effectiveness of

IPM within a process of concurrently establishing nation-wide networks for the forecasting of pest outbreaks in recipient countries. Policies on pest control show a clear shift towards IPM. With regard to pesticide procurement, several agencies have formulated criteria for the selection of pesticides suitable for use under the prevailing circumstances in developing countries. Some agencies request an environmental impact assessment for the procurement of large quantities of pesticides.

Although there has been an important change in aid agencies' development assistance policies regarding pest control, much remains to be improved. The aim should be that aid agencies do sufficiently take into consideration the circumstances under which the pesticides are to be used and avoid providing inappropriate or excessive pesticide donations. IPM deserves more concrete attention in the form of project and programme support and should be the prime focus of development assistance to plan protection programmes and agricultural intensification programmes.

Donor co-ordination is important for aid activities concerning pest and pesticide management in order to avoid duplication and conflicting activities. In this respect, both international co-ordination and recipient-led local co-ordination are important. For some specific fields international co-ordinating arrangements have been established. FAO, for instance, plays a co-ordinating role in the monitoring and control of locust. At regional level, the recipient countries have sometimes assigned co-ordinating roles concerning IPM and pesticide management to regional intergovernmental organisations or commissions.

### **III. Guidelines for Aid Policies on Pest and Pesticide Management**

In view of the current situation concerning pest and pesticide management in recipient countries, OECD aid agencies adopt the following policy orientations and guidelines as the framework for their aid programmes involving crop protection and/or the procurement of pesticides:

- A. ***Promoting IPM as the preferred approach to pest control*** in order to establish sustainable production systems including the reduction of the use of pesticides in the longer term.
- B. ***Strengthening pesticide management policies and capabilities in recipient countries*** to improve the situation in the medium and longer term.
- C. ***Ensuring good practices when providing pesticides under aid programmes*** in order to reduce the environmental, occupational and health hazards connected with the use of pesticides to the absolute minimum.

**A. Promoting IPM as the preferred approach to pest control**

To support the introduction and application of IPM, aid agencies should:

1. Shift the emphasis of aid policies concerning plant protection from agricultural input supply to human resource development. The focus should be on strengthening plant protection services, IPM training programmes for farmers and research where necessary.
2. Support the introduction and application of IPM through the funding of national or regional IPM projects or programmes. This would require commitments for longer periods, because the introduction of IPM on a large scale is a multi-year process. (Annex 1 provides recommendations for the formulation of IPM projects.)
3. Promote awareness among policy-makers in recipient countries of the benefits and achievements of IPM. Government commitment to IPM is essential for its development and implementation and could be enhanced through:
  - organisation of study tours for senior government officials to familiarise them with the benefits and achievements of IPM in other countries, which have already accepted IPM as the official crop protection strategy and where the impact of IPM is evident;
  - organisation of national or regional workshops and conferences on IPM in collaboration with experienced organisations;
  - active advocacy of IPM as the preferred approach to crop protection.
4. Assist at the planning stage of agricultural intensification projects and programmes in assessing the prospects of IPM in such programmes. Assistance could involve provision of information on existing ready-to-use technological packages and technical assistance. There also exist various fora for the exchange of information on IPM, such as the FAO Panel of Experts on IPM.
5. Support research on tactics that contribute to IPM (especially biological control, host plant resistance, cultural practices and pest outbreak forecasting), support the development of local production of safer native biopesticides such as bacteria, viruses, fungi and nematodes and support the training of research personnel, preferably through training programmes in their home countries or in the region.
6. Encourage the establishment of multi-disciplinary national IPM steering committees to guide and co-ordinate the introduction of IPM.
7. Provide technical assistance to recipient governments to assist in formulating and developing policies which are conducive to the promotion and implementation of IPM. This could include assistance

in formulating medium and long-term strategic plans to strengthen plant protection with emphasis on IPM (research, training, extension, implementation, regulation and control concerning pesticides and plant quarantine) and the development and implementation of environmental policies and legislation.

8. Treat requests for the provision of pesticides with utmost care. Aid agencies should enter into dialogue with governments requesting pesticide donations in order to establish whether there are alternatives and whether the requested pesticides are really necessary. Decisions should be made on a case-by-case basis. In general, pesticides should not be supplied to sectors for which effective IPM tactics are available, unless they are part of an IPM programme. General and vaguely specified requests for bulk quantities of pesticides under programme assistance or balance-of-payments support should not be considered. There should be a re-appraisal of pesticide supplies which are routinely provided under ongoing input supply programmes.
9. Agree with the recipient government that donated pesticides used for purposes other than emergency operations are sold locally at realistic prices in order not to distort the production costs for crops grown with and without pesticides.
10. Promote regional co-ordination and co-operation on IPM through support to:
  - network systems for the exchange of information on IPM;
  - technical co-operation among developing countries in the region on IPM;
  - regional fora, workshops and conferences on IPM.

### ***B. Strengthening pesticide management policies and capabilities in recipient countries***

Although IPM may significantly decrease pesticide use in certain subsectors, the agricultural sector as a whole will continue to use pesticides for crop protection and a variety of other purposes. The overall use of pesticides in developing countries is not expected to show a rapid decline. It is therefore important that developing countries strengthen their pesticide management policies and capabilities within the framework of the *International Code of Conduct on the Distribution and Use of Pesticides*. Aid agencies should support this process. Such support could include technical and financial assistance to:

1. The establishment of pesticide legislation and the implementation of the Prior Informed Consent (PIC) scheme in accordance with UNCED Agenda 21, Chapter 19. Specific assistance is required in drafting legislation and training of National Focal Points for PIC. Assistance in this field should be co-ordinated with FAO, which is implementing several regional projects for the implementation of the Code of

- Conduct, to assist in the drafting of legislation and to promote harmonised pesticide registration requirements/procedures. The training of national focal points for the implementation of PIC could best be supported in collaboration with the existing joint training programmes of FAO, the United Nations Environment Programme (UNEP) and the United Nations Institute for Training and Research (UNITAR).
2. The strengthening of the necessary infrastructure for the enforcement of pesticide legislation in countries which have demonstrated commitment towards regulating the distribution and use of pesticides. Specific requirements for assistance include: strengthening pesticide registration boards through training of academics in fields necessary for the implementation of a pesticide registration scheme; training of inspectors to monitor compliance with pesticide legislation; upgrading of existing laboratories to enable them to conduct pesticide quality control analysis for the verification of pesticide specifications, as well as for pesticide residue control in those countries which can provide for the long-term costs of running such laboratories.
  3. The development of a price policy for pesticides which is geared towards realistic cost pricing.
  4. The promotion of non-chemical alternatives to pesticides, such as biological control.
  5. Regional and sub-regional initiatives for harmonisation of pesticide registration requirements and procedures and other forms of co-ordination and co-operation in the field of pesticide management. Co-operation among countries is likely to be particularly valuable for small countries with limited resources for research and with limited expertise for the implementation of a pesticide registration scheme<sup>10</sup>.
  6. Training programmes for extension staff in IPM and hazard reduction in the handling and use of pesticides. Extension programmes should involve women in recognition of their role in agricultural production.
  7. The construction of appropriate storage facilities and training in storage management in order to minimise the hazards connected with the storage of stocks of pesticides, particularly when they have become obsolete. Good storage practices also reduce the risk of accelerated deterioration of the stored pesticides.
  8. The disposal of obsolete pesticides. Since most developing countries lack safe and environmentally sound disposal facilities, this would involve shipment of such pesticides to dedicated hazardous waste incinerators which may be found in OECD Member countries. In the long term however, it will not be feasible to ship all obsolete pesticides to OECD countries. In particular, left-overs of stocks provided by the aid agencies themselves should receive priority. Urgent attention should be paid to obsolete stocks which have already started to leak. For the future, donors are recommended to assist developing countries

with the development of safe and environmentally sound local disposal methods in accordance with developing country or internationally acceptable standards.

### ***C. Ensuring good practices when providing pesticides under aid programmes***

Requests for the provision of pesticides should be subject to careful appraisal procedures to avoid inappropriate and excessive supplies. The following provides guidance for the appraisal of requests and for good practices when providing pesticides:

1. To enable a careful appraisal of requests for pesticide procurement, each request should be adequately justified and should be specific about: the intended use of the pesticides; the product specifications; the required quantity; packaging requirements; items to be delivered with the pesticides in order to reduce hazards. The Checklist should be used to determine whether all necessary information has been provided. Missing information should be obtained through dialogue with the recipient country.
2. Pesticide procurement should fully comply with national pesticide legislation and regulations of the recipient country. The PIC procedure should be complied with.
3. Extremely and highly hazardous pesticides of the World Health Organisation (WHO) Class Ia and Ib<sup>11</sup> and compounds which are highly persistent in the environment should not be provided. Exceptions could only be considered if all three of the following criteria are met: a) there are urgent reasons to use these pesticides; b) there are no safer alternatives; and c) their safe and controlled application can be guaranteed. Pesticides of Class Ia, Ib and the more toxic range of Class II, are generally considered to be unsuitable for use by small-scale farmers.
4. The quantity provided should be consistent with the actual requirements and the local capacity to store, distribute and apply the pesticides. If any of these capacities is limited, the pesticides should be provided in smaller consignments spread over a period of time. Because of the limited shelf-life of most pesticides, stocks should not exceed their shelf life. The additional costs of providing pesticides in smaller consignments and different shipments will, in most cases, outweigh the costs that will be incurred if stocks become obsolete as a result of prolonged or improper storage.
5. Pesticides should only be provided in combination with “hazard-reduction packages”. Such packages should comprise the following items, unless it has been confirmed that these items are already available in the area where the pesticides are intended to be used:

- adequate quantities of antidotes with medical instruction for distribution to health posts in the area where pesticides that could cause serious poisoning are intended to be used;
- adequate quantities of appropriate protective gear;
- appropriate and safe application equipment;
- a number of salvage drums (over-drums to contain drums that start leaking) and a drum crusher with rinsing instructions for large quantities of pesticides packed in 200 litre drums (e.g. for locust control);
- Material safety data sheets providing information on how to handle accidents with the pesticides concerned (available from the manufacturer of the product).

Further, the package should include training of users, both men and women, in the appropriate use of pesticides and in understanding hazards connected to the use of pesticides, if these have not yet been trained.

6. Containers should be durable enough to meet rough transport and storage conditions. Labels should be in the national language, as well as in the local language of the area of intended use, and have pictogrammes for illiterate users. Labels and packaging should comply with relevant FAO Guidelines. Purchase orders and tender documents should spell out the labelling requirements and the minimum container quality requirements.
7. The establishment of large on-site strategic stocks for locust control emergency operations should be avoided. Instead, donors should investigate the possibility of establishing so-called “pesticide bank” arrangements, whereby pesticides are kept on stand-by at the location of their manufacture to be flown in when their use is actually required. Research into locust control methods which require less pesticides should be given high priority.
8. Provision of large quantities of pesticides should be preceded by an environmental impact assessment<sup>12</sup>. The environmental impact of extensive spraying operations under locust control emergency operations should be monitored.
9. Aid agencies are encouraged to assist recipient countries with the urgent problem of pesticide left-overs and obsolete pesticides through investigating possibilities for:
  - local refund-systems for empty containers of pesticides used by farmers;
  - arrangements with suppliers to accept unused left-overs of pesticides for reformulation or destruction. (See also “Obsolete Pesticides and their Disposal” in Annex 2.)
10. Aid agencies are encouraged to establish internal criteria and procedures for the selection and procurement of pesticides. The FAO

provisional Guidelines on the Tender Procedures for the Procurement of Pesticides provide guidance in this field. (Annex 2 provides some suggestions for criteria for the selection of pesticides.)

**CHECKLIST: INFORMATION REQUIRED FOR APPRAISAL OF REQUESTS FOR THE PROVISION OF PESTICIDES**

*Use*

- purpose for which the pesticides are required;
- reason why the use of pesticides is necessary and alternative non-chemical methods cannot be used.

*Product specifications*

- justification for the selection of the requested active ingredient and formulation (referring to: efficacy; environmental considerations; occupational and public health considerations; the available type of application equipment)

*Quantity*

- required quantity (referring to the extent of infestation and the size of the area to be treated; present stocks; capacity to distribute the pesticides effectively; application capacity in terms of available equipment and trained staff; storage capacity)

*Packaging requirements*

- required quality of packaging (referring to: climate; storage and transport conditions; risk of prolonged storage);
- required package size (referring to the available type of application equipment);
- required languages for labels;

*Hazard reduction*

- level of knowledge among envisaged users about the hazards connected to the use of pesticides and their appropriate use (to determine whether training is necessary);
- availability of protective gear in area of use (to determine whether protective gear should be supplied with the pesticides);
- availability of antidotes at health posts in the area of use (to determine whether antidotes should be supplied with the pesticides);
- availability of facilities to dispose of empty containers (to determine whether a drum crusher should be supplied with the pesticides).

#### **IV. Donor Co-ordination**

To enhance donor co-ordination at international and national level, aid agencies should:

1. At an early stage, consult FAO and/or other relevant international or regional organisations when considering project activities in the field of IPM or pesticide management.
2. Co-ordinate all locust control emergency assistance with FAO in order to prevent duplication of donations, which in the past contributed to the accumulation of obsolete pesticide stocks.
3. Encourage the establishment of recipient-led local mechanisms to co-ordinate donor response to government requests for assistance to specific subjects<sup>13</sup> (e.g. the promotion of IPM; locust control emergency operations; disposal of obsolete pesticide stocks; etc.). This could take the form of committees comprising representatives of the relevant government departments and local representatives of aid agencies.

The internal co-ordination within an aid agency can also be improved. Aid agencies should designate a focal point for IPM and pesticide matters. Approval by this focal point should be required for each pesticide procurement. Furthermore, aid agencies need to strengthen their institutional memory by the build-up of a database on their provision of pesticides. Aid agencies should also consider establishing an international co-ordination mechanism for the inter-agency exchange of information on planned, ongoing and completed projects. The points mentioned under the section ***Ensuring good practices when providing pesticides under aid programmes*** should serve as a checklist for clearance of pesticide procurement.

## Notes

1. Extrapolated from Wood Mackenzie, May 1993.
2. According to a recent study carried out by the International Rice Research Institute (IRRI), the use of pesticides brings about a reduction in productivity where individual farmers are concerned and consequently has serious negative economic effects.
3. Pesticide Action Network Asia and the Pacific, Annual report 1992: referring to statistics published in a WHO journal in 1990.
4. The situation is particularly bad in cotton production. In 1992/1993 Asian countries suffered major setbacks in cotton production due to the development of resistance and secondary pests. National production records showed declines in production of up to 35 per cent.
5. van der Wulp, H.P. (1993), *Prevention and Elimination of Obsolete Pesticides in Developing Countries*, Published for GLOBE by AIDEnvironment, Amsterdam.
6. P.A.C. Ooi, G.S. Lim, T.H. Ho, P.L. Manalo and J. Waage (eds.), *Integrated Pest Management in the Asia-Pacific Region*, Proceedings of the Conference on IPM in the Asia-Pacific Region, 23-27 September 1991, Kuala Lumpur, Malaysia.
7. FAO (1992), *Third Phase Project Document for Intercountry Programme for Integrated Pest Control in Rice in Southeast Asia*.
8. Kremer A.R. (1992), *Pests and Donors in Mali*, the Journal of Disaster Studies and Management, Volume 16, Number 3, Blackwell Publishers, Oxford, United Kingdom.
9. For details, see: Fleischer, G. (1993), *Review of Pesticides Policies of Major Donor Institutions*, Report to the FAO/UNEP Panel of Experts on IMP, FAO.
10. In 1991, nine Sahelian countries [the Permanent Inter-States Committee for Drought Control in the Sahel (CILSS) Member states] decided to establish a common registration scheme. The two main reasons for this initiative were: 1) Harmonization of pesticide registration procedures among CILSS countries, and 2) making effective use of scarce resources and expertise in the region by pooling them in a common scheme.
11. The WHO classification by hazard is the general accepted standard for classifying pesticides by hazard. For details concerning this classification system, see *The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 1992-1993*, WHO, Geneva.
12. An example of what an environmental assessment could involve is provided by the World Bank Operational Directive OD 4.03.
13. See also the OECD/DAC Guiding Principles for Aid Co-ordination with Developing Countries; Local, sectoral and regional dimensions.



*Annex 1*

## **FURTHER BACKGROUND INFORMATION ON INTEGRATED PEST MANAGEMENT (IPM)**

### **What is IPM?**

IPM can be described as the farmer's best mix of control tactics, taking into account yields, profits, safety and sustainability. IPM is an approach to pest control and not just a set of techniques one learns and applies. Its basis is an understanding of the ecology and interaction of the crop and pest concerned. On the basis of this understanding, techniques are selected and applied to keep the impact of the pest below economically damaging levels. Techniques used in IPM include:

- Cultural control (crop rotation, inter-cropping, field sanitation, strip harvesting, altering planting or harvest dates, water management) to make the environment less hospitable to pests and/or more hospitable to natural enemies of the pest.
- Biological control (introduction or re-introduction of the pest's natural enemies, parasites or pathogens).
- Use of pest resistant crop varieties.
- Judicious and selective use of pesticides when other economically viable alternatives do not exist, when damage or loss levels are exceeding economic thresholds and other control methods have failed. In general, bio-pesticides and growth regulators are preferred over chemical pesticides, highly selective pesticides over broad spectrum pesticides and quickly degradable pesticides over persistent pesticides.

In both industrialised and developing countries, IPM programmes have demonstrated that it is possible to sustain or increase agricultural production levels, while reducing the use of pesticides, in particular insecticides. IPM makes agricultural production less dependent on external inputs and more cost-effective. Biodiversity is conserved and environmental contamination by pesticides is reduced to a minimum. Health hazards are reduced and farmers are empowered to make more decisions over their crops. Development becomes more sustainable with IPM.

IPM does not necessarily require intensive preparatory research and complicated decision making. As an approach, IPM can be introduced at any level of agricultural development. It can be included in small-scale farmer's projects, schemes for the production of industrial crops, and in the design of large scale agricultural intensification programmes. At field level, a simple IPM strategy can usually be drawn up on the basis of existing information about the crop and its pests. At a later stage such strategies can be developed and refined when experience is gained and additional research has been conducted. Starting with a simple strategy helps in identifying research requirements for the enhancement of IPM strategies tailor-made to the local situation.

### **Current approach to IPM**

Impressive results have been achieved in IPM in rice production in Asia. Two decades of experience have yielded a mature approach to IPM, which can be applied to different crops and now stands as a model for the development and improvement of other IPM programmes. The three key elements of the approach are:

- A. Training of farmers, both men and women, in such a way that it enhances their actual understanding of crop ecology and crop-pest relationships, to enable them to make their own pest control decisions on the basis of field observations.
- B. Effective inter-action between research institutes, extension services and farmers. Research should be applied and farm-oriented. The farmers themselves should be involved in research programmes through participatory research.
- C. Sensitising policy-makers about the achievements and benefits of IPM. Their support is necessary to achieve a shift from pesticide-oriented national crop protection policies to IPM-oriented policies. Such a shift in policy would include the removal of subsidies from pesticides and an increased investment in IPM research and extension.

The following paragraphs provide more detailed information on the various elements of IPM programmes. Recommendations are largely based on evaluation of recent and ongoing IPM programmes.

### ***Training***

Training is an essential component of any IPM programme and comprises a variety of areas (e.g. pest and beneficial organism identification; field monitoring; basic ecological principles; biological and cultural pest management tactics; the concept of economic thresholds for pesticide application; pesticide selection, application and hazard reduction; financial aspects of different pest control scenarios).

Training programmes are normally based on a train-the-trainer concept. The trainers to be trained could be government extension staff or trainers from relevant NGOs. Training should be organised in the field and should involve regular (weekly) sessions throughout the growing season of the crop concerned. The same applies to the training of farmers. Training of farmers can best be organised in close collaboration with local farmers' organisations. In recognition of the role of women in agriculture, which includes handling of pesticides and treated crops, it should be ensured that female farmers are fully involved in training programmes.

In several programmes, farmers make their own learning materials, from drawings of insects to field trials. These materials are always consistent with local conditions, are less expensive to develop and are directly understood by the learners. Sheets of paper, note blocks, crayons and plastic bags are all that is needed.

Training in IPM requires additional skills of extension agents. They become facilitators and motivators, rather than teachers diffusing information in a one-way direction. Extension becomes a participatory process, fostering inter-action between extension agents, farmers and researchers. This new role may require additional training of extension agents.

To generate broad support for IPM, it should not only be a subject in curricula at agricultural schools and colleges, but also a module in licensing courses for pesticide retailers, training of staff of agricultural credit unions, training of women's group organisers and agricultural curricula at primary and secondary schools.

## **Research**

Applied research is the basis of the development of IPM strategies. The involvement of institution-based researchers is desirable, although, if necessary, IPM strategies could also be developed on the basis of field experiments conducted by NGOs, extension staff or the farmers themselves.

IPM can often be introduced without an extensive preparatory phase of field research. IPM field research results are already available for most major crops (including rice, cotton, sugar-cane, fruits, cruciferous and solanaceous vegetables, oil palm, cocoa, coconut and banana), but often remain on the shelf, because insufficient follow-up has been given to their implementation at farmer's field level. What holds back IPM is rarely the lack of research results, but the gap between research results and field practice.

The collection of available IPM research findings is therefore the first step. Often it is possible to start pilot-project activities with a simple strategy based on available research findings, provided that an effective arrangement is made between researchers, extension staff and farmers to participate jointly in monitoring impact and in developing and refining the strategy through additional research.

Research should be applied and training-driven. Farmers' questions should steer the research agenda. In Asia, direct involvement of farmers through

participatory research provided an enormous stimulus for both researchers, extension staff and farmers themselves. This way, tailor-made IPM programmes were developed on-site in the farmers' fields. Among farmers, participatory research contributed to confidence through knowledge and understanding.

Common research issues include: basic studies of the agro-ecosystem; pest-resistant crop varieties; impact on pests of cultural practices; possibility of biological control methods; determination of decision tools on interventions (e.g. economic threshold levels); selection of pesticides. Applied research thus complements the scientific methods of hypothesis testing to build a knowledge base for sound pest management.

### ***Policy-development***

Nation-wide IPM programmes will only be successful if these are supported by appropriate government policies on crop protection. IPM should be adopted as a significant part of national agricultural policies, to ensure that other actions to promote IPM will follow. Such policies should include the following elements:

- Reduction or elimination of subsidies on pesticides, which distort economic comparisons with non-pesticide alternatives.
- Re-orientation of national research, extension and agricultural education programmes towards IPM practices.
- Earmarking of specific and adequate funds for IPM to ensure that national agencies have the resources to carry out an IPM policy.
- Establishment of national steering committees to guide the introduction of IPM. Such committees should include senior staff from relevant ministries, research institutes, extension services and farmers' organisations.

Aid programmes should therefore comprise activities to sensitise policy-makers and senior staff at relevant ministries about IPM. In this respect, the following activities and instruments have proved to be useful:

- regular supply to key policy-makers of facts and figures concerning achievements (including economic and environmental benefits) of IPM programmes in other countries and of IPM pilot activities in the country concerned;
- organisation of study tours for policy-makers to successful IPM projects in countries that have already made IPM their official crop protection policy;
- encouragement of the establishment of national IPM steering committees;
- organisation of national and regional workshops on IPM;
- provision of information on IPM to NGOs campaigning against excessive use of pesticides.

## **Starting IPM activities**

Below is a brief overview of preparatory activities for the planning, formulation and establishment of IPM projects.

### ***Initial co-ordination***

At the planning stage, FAO and other relevant international organisations should be contacted for an update of relevant IPM experiences in the region. Such experiences may offer valuable information for the formulation of project activities.

### ***Selection of project area and identification of target group***

Activities should start in an area where farmers feel the need for IPM, or at least feel a need for change or improvement, or in an area where pest management professionals' knowledge and experience indicate the development of a potential problem. In general, their motivation is highest in areas where crop protection has reached a crisis situation with an upward spiralling use of pesticides achieving hardly any significant impact on pest populations. Farmers involvement can best be organised in close co-operation with existing active farmers' organisations.

### ***Initial reconnaissance***

Activities start with an initial reconnaissance to obtain the necessary base-line information. This stage would involve the following activities:

- description and assessment of the cropping system (e.g. genotypes, value, role in the farm, rotation systems);
- identification and inventory of pests (biology and ecology, natural enemies);
- collection of available relevant IPM research findings and recommendations for non-chemical control methods;
- collection of information about local traditional control methods;
- identification of the social, cultural, economic and institutional context (including farmers' knowledge, attitudes, practices and priorities; and related gender issues).

### ***Co-ordinating arrangements***

Arrangements are to be made for the co-ordinated involvement of a research station, extension services and farmers' organisations. Co-ordinating arrangements also involve briefing of policy-makers and local authorities to solicit their co-operation in facilitating farmer-based IPM and providing working facilities to

optimise extension and research. The benefits of, and possibilities for, the involvement of local NGOs should be investigated.

### ***Pilot activities***

A simple IPM strategy is developed on the basis of the findings of the initial reconnaissance. Pragmatic farmer training methods and materials are developed during the training of the first batch of extension staff and farmers. At this stage, priorities can be identified for further research to refine the strategy. Techniques recommended by research should be tested in several locations in co-operation with farmers.

### **Obstacles hampering the introduction of IPM**

Several specific problems may make it more difficult to implement IPM programmes. The most common ones include:

- An under-funded government extension service which lacks transportation, incentives, and access to technical information.
  - The solution to this problem would involve a shift in government commitment towards IPM and sustainability. Alternatively, there might be NGOs with effective farmer training programmes, which could be involved instead.
- Shortage of well-trained scientists to support IPM programmes.
  - Although many countries have a core of relevant scientists, some countries don't. This problem could be solved by training researchers in relevant disciplines and/or by putting more emphasis on participatory research by extension staff and farmers. With regard to scientific training, donors should investigate possibilities to offer such training at academic institutions in the recipient country or the region as an alternative to study in the donor country. This would strengthen southern academic institutions and allow for larger numbers of students to be trained. It would also address the drawback that northern graduate degree programmes are often not applicable to the needs in developing countries and that many graduates in the short-term do not return to their home countries after having obtained their degree.
- Impact of the promotion campaigns of the agrochemical industry.
  - The agrochemical industry has huge budgets for the promotion of its products. The message of their promotional campaigns may hinder the promotion of IPM. On the one hand, pesticide companies often have a significant influence on research and extension programmes through the funding of pesticide efficacy research and the training of extension staff

in the safe use of their products. On the other hand, this has resulted in product promotion, engraining in the average farmer that pesticides are necessary for production. Experience in Asia has demonstrated that these impacts can be counteracted by inclusion of IPM in the campaigns and the policy-lines as mentioned above. Farmers who understand what is actually happening in their fields, no longer accept advice which is not in line with their own experience and observations. Asian farmers who had been trained in IPM appeared to stay committed to IPM. Policy-makers who have been convinced of the advantages of IPM have in several countries been prepared to make bold decisions concerning the role of pesticides in crop protection. In Indonesia for instance, subsidies were removed and a large number of pesticides was banned from use in rice production.



*Annex 2*

## **FURTHER BACKGROUND INFORMATION ON PESTICIDE MANAGEMENT**

This annex provides further background information on selected pesticide management issues. The information is not meant to be comprehensive or complete. It just aims to highlight some specific issues which are of direct relevance to aid agencies' policies concerning pesticide donations.

### **International Code of Conduct on the Distribution and Use of Pesticides**

In response to a growing international concern about the many problems with pesticides in developing countries, the FAO drew up the International Code of Conduct on the Distribution and Use of Pesticides, which was unanimously adopted by its member states in 1985. In 1989, the Code of Conduct was amended to include the Prior Informed Consent (PIC) procedure. The Code of Conduct defines and clarifies the responsibilities of various parties involved in the development, distribution and use of pesticides. In 12 articles, it covers all aspects of pesticide management, including: pesticide management, testing of pesticides, reduction of health hazards, regulatory and technical requirements, availability and use, distribution and trade, information exchange and PIC, labelling, packaging, storage, disposal, advertising, and the monitoring of observance of the Code. The Code represents a wide consensus among governments, the pesticide industry and environmental organisations. Although the Code is a voluntary standard, all FAO member states and the agrochemical industry have endorsed it and agreed to its implementation.

In addition to the Code of Conduct, the FAO prepared a series of Technical Guidelines which provide more detailed guidance on various specific aspects of pesticide management. A list of these Guidelines is provided in Annex 3.

The implementation of PIC commenced in 1991. PIC is a notification procedure intended to provide an instrument for developing countries to avoid undesired import of pesticides, which in other countries are banned or severely restricted for public health or environmental reasons<sup>1</sup>. A number of highly toxic pesticides that have not been banned will in future also be subject to the PIC

procedure. This procedure is expected to lead to a better-informed and more critical selection of pesticides by developing countries.

Since the adoption of the Code of Conduct, many initiatives for its implementation have been taken by governments, international organisations and the agrochemical industry. Although much progress has been made, the overall picture is that there still is a long way to go before full implementation of the Code of Conduct has been achieved.

### **Pesticide legislation and regulations**

Many developing countries now have pesticide legislation and a pesticide registration scheme. Enforcement of the legislation, however, often appears difficult. Constraints include: lack of government commitment and priority to regulate pesticides; lack of technical expertise to operate a pesticide registration scheme; lack of laboratory facilities for quality control analysis to back up the pesticide registration scheme; lack of staff (trained inspectors) to monitor compliance with the legislation.

Because of limited national resources, facilities and availability of expertise, it may be advantageous for groups of countries to pool resources and to establish a common registration scheme. An initiative for such a common system has for instance been taken by the Sahelian countries.

Aid agencies can assist the establishment of effective pesticide legislation in the following ways: assistance in drafting legislation; fellowships to train experts in fields required for a pesticide registration committee; training of enforcement staff; upgrading of laboratories or provision of analytical services; support to initiatives of regional organisations promoting regional harmonisation of pesticide registration requirements and procedures, or the establishment of common registration schemes.

### **Banned pesticides**

Pesticide registration is the usual method to permit, restrict or ban the use of specific pesticides. After a company has applied for registration of its product, the application will normally be evaluated by a pesticide registration board, made up of government appointed experts in relevant fields. They decide whether the pesticide concerned is registered for use; registered for restricted use; or is not registered. The use of pesticides which have not been registered is prohibited. The registration status is usually reviewed after a fixed period of time. The registration of a pesticide can be cancelled after review, or can be withdrawn by the company if they do not wish to extend it. (A reason for withdrawal by the company would be that expenditure on registration fees for such an extension is no longer justified by the volume of sales of the product.) If, on the basis of new information, there are immediate concerns about the effects of a pesticide on public health or the environment, its registration can be suspended pending a review. In countries

which do not have a registration scheme, specific pesticides sometimes have been banned through a presidential decree.

The registration status of pesticides in the United States or Europe is often used as an indication of its hazardousness and suitability for use in developing countries. In general, this comparison is useful, but it also has some pitfalls. Pesticides registered in the United States or Europe are not per se suitable for developing countries. Safety standards are often more difficult to meet in developing countries, which makes the more toxic pesticides often unsuitable, despite their registration status in the North. On the other hand, pesticides which have not been registered in Europe or the United States are not always per se inappropriate for developing countries. Companies may not apply for registration of their product in Northern countries, because there is little point in paying registration fees for products which have been developed for tropical crops and therefore would not be used in Northern countries anyway. Another factor is that the proposed use in developing countries may be very different from the original use for which the pesticide was evaluated in the North. An example is malaria control. Under malaria control programmes, health services spray thatch roofs in which mosquitos seek refuge during the day. Because these services cannot come back to spray roofs every week, a pesticide with a long residual effect is required. In the North, where the only potential use would be pest control in agriculture, such pesticides may be considered unsuitable because of the risks of residues on food crops.

Pesticides should be considered unsuitable for developing countries, in particular if: in OECD countries registration has been rejected or cancelled for environmental or health reasons; if no complete assessment has been made, as would have been required for registration in a Northern country; if their use is hazardous (WHO Class I and II) and prescribed safety precautions are unlikely to be met by the envisaged users.

### **Selection of pesticides**

In the past, there have been many problems with pesticides provided by aid agencies which could have been avoided by a more careful selection, taking into consideration the specific situation in the recipient country. Keeping in mind that knowledge about their effects on the environment is still very limited, the choice of pesticides should be established in dialogue with the recipient country. The following factors are to be taken into consideration:

- Registration status. Does the recipient country has a registration scheme? What is the registration status of the pesticides under consideration in the recipient country? What is the registration status of the pesticides under consideration in OECD countries?
- Health considerations. Specific hazards connected to the chemical and physical properties of the product. What is the level of training and knowledge about pesticides among the envisaged users? Is appropriate protective gear adequately available?

- Environmental considerations. Possible effects on non-target organisms; persistency in the environment; the risk of soil and water contamination and the effect on terrestrial and aquatic ecosystems.
- Efficacy of the pesticide. Have trials been conducted locally and is the envisaged product effective against the pest problem?
- Extension programmes. Have extension staff and farmers been trained in the use of specific formulations? (If farmers have been trained in the use of a certain formulation, one should realise that changing to a different formulation may cause great confusion and may require additional training activities.)
- Type of application equipment. What formulations and what package size could best be used with the available application equipment?
- Stability of the product and its container, in case there is a risk of prolonged storage under unfavourable conditions.

With regard to health and environmental considerations, reference is made to: the WHO recommended classification of pesticides by hazard and guidelines to classification; the FAO Guidelines for Environmental Criteria for the Registration of Pesticides; the WHO/IPCS Environmental Health Criteria; the WHO/IPCS Health and Safety Guides; the World Bank Guidelines and Best Practice: Agricultural Pest Management. (See Annex 3 for details concerning these publications.)

### **Procurement of pesticides**

Procurement or tender documents should spell out in detail the specifications of the pesticide and its packaging. Product specifications should include the types and acceptable range of concentrations of active ingredients, type of formulation, physical characteristics and storage stability. Packaging specifications should detail the size and durability of containers and labelling requirements. Labels should be in conformity with relevant FAO Guidelines and contain instructions for the safe handling, use and disposal of the product. They should be in the official national language and possibly also in the major local language of the area where the pesticides are to be used. They should have pictogrammes for illiterate users and be durable enough to sustain sunlight, humidity and leakage.

Procurement or tender documents should also outline the responsibilities of the supplier. It is recommended to state explicitly that the supplier is obliged to take back the pesticides if, upon delivery, properties appear to deviate from the requested specifications. Costs of collection, transport and reformulation or disposal should, in such cases, be borne by the supplier.

For detailed recommendations concerning packaging, labelling and pictogrammes, reference is made to the relevant FAO Guidelines listed in Annex 3.

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## **Transport, storage and use of pesticides**

Detailed guidelines for the safe transport, storage and use of pesticides have been prepared by FAO, the International Group of National Associations of Agrochemical Manufactures (GIFAP) and several other organisations. A selection of these guidelines is presented in Annex 3 under the heading: Pesticide Management: Technical Guidelines.

## **Obsolete pesticides and their disposal<sup>2</sup>**

Large quantities of pesticides stored in developing countries have become obsolete. They can no longer be used because they have degraded or because their use has been banned or is no longer considered acceptable for health or environmental reasons. Such pesticides are classified as hazardous waste.

Important groups of obsolete pesticides are:

- Old organo-chlorine compounds such as DDT, dieldrin and BHC, of which the use has been banned or is being phased out. Several of these stocks are 10-30 year old strategic stocks for locust control.
- Organo-phosphate compounds which have degraded due to prolonged and/or improper storage. Pesticides of this group normally have a limited shelf-life. If they are not used in time, they are likely to degrade and become obsolete.

The total quantity of obsolete pesticides in Africa is estimated at 20 000 to 30 000 tonnes. Obsolete stocks in Asia have been less documented, but information from a number of individual countries suggests that the situation might be worse.

The main factors which have caused the accumulation of obsolete pesticides include: donations or purchases in excess of requirements; donations of inappropriate products (not effective, not stable under tropical conditions, not usable with the available application equipment, etc.); banning of products while they were still kept in store; inappropriate storage facilities and poor storage management. In many African countries, the major part of the obsolete pesticides are left-overs of pesticide donations provided as aid.

Because most developing countries do not have appropriate facilities for the safe and environmentally sound disposal of obsolete pesticides, the total quantity is constantly increasing. Storage conditions under which these pesticides are kept are in general inadequate. At a large number of locations drums have started to leak and are posing an imminent threat to human health and the environment. The scale of leakage will increase as corrosion of drums of present stocks proceeds. If no action is taken to contain and dispose of these stocks, millions of litres of concentrated pesticides may eventually leak into the ground. Several of these stores are located in urban areas or near water resources (irrigation schemes). Environmental disasters should be anticipated if the situation is not brought under control.

Presently, the recommended disposal method is shipment to a dedicated hazardous waste incinerator in an industrialised country<sup>3</sup>. High temperature incineration in mobile incinerators or cement kilns could, under certain circumstances, be considered as a second option, but both have their limitations and specific disadvantages. Long-term storage is only an option for pesticides which cannot be incinerated such as compounds containing mercury. For other pesticides it is not recommended because long-term safety can normally not be guaranteed. Landfill disposal, chemical treatment or spraying out in remote areas may be a solution for very specific groups of pesticides. Other disposal methods are unsuitable for bulk quantities of pesticides or for circumstances in developing countries<sup>4</sup>. In the longer term, shipment of pesticides for incineration as the common disposal method would be too expensive and undesirable within the spirit of international policies on the disposal of hazardous waste<sup>5</sup>. Donors should therefore assist in developing alternative local disposal methods which are safe and environmentally sound. However, local disposal methods supported by donors, should meet the same environmental standards as would be required in the donor country itself.

The problem of obsolete pesticides requires urgent attention. Recommended action includes:

- a) Recipient countries, aid agencies and other donors should take measures to avoid a further accumulation of obsolete stocks. The basic principle is that pesticides should only be provided if they match the actual requirements (quantity, type/formulation, package size, stability of product and container, etc.). Local stocks should not exceed a shelf life's requirement. Implementation of guidelines provided in the section entitled ***Ensuring good practices when providing pesticides under aid programmes*** will help avoid a further accumulation of obsolete pesticides.
- b) Recipient countries, with the assistance of aid agencies, should urgently take the necessary first aid measures to secure present obsolete stocks. This would include repacking of all pesticides currently kept in leaking, heavily damaged or corroded containers and arranging for their safe and proper storage.
- c) Aid agencies should provide analytical services to recipient countries to assist them in determining whether their older stocks can still be used or have become obsolete.
- d) Aid agencies need to make a concerted effort to provide the required technical and financial assistance towards the disposal of current obsolete stocks of pesticides. Shipment for incineration is expensive and can often not be afforded by the countries themselves. Such assistance seems particularly justified for obsolete stocks which are left-overs from pesticide donations provided under aid programmes.

## Notes

1. Under the PIC procedure, participating countries nominate a Designated National Authority (DNA), which acts as the national focal point. The DNA informs FAO and UNEP if the country concerned decides to ban or severely restrict the use of a certain pesticide for health or environmental reasons. FAO then prepares a Decision Guidance Document and sends this along with an Importing Country Response (ICR) form to all participating countries. The countries are requested to inform FAO within 90 days, by filling out the ICR forms, whether or not they wish to continue to allow the import of the pesticide concerned into their country. Exporting countries participating in the procedure have agreed not to permit the export of particular pesticides to countries which replied that they do not wish to allow further import of those pesticides. For details, reference is made to: FAO (1989), Code of Conduct on the Distribution and Use of Pesticides (Amended version), Article 9, and FAO (1991), Guidance for Governments, Joint FAO/UNEP Programme for the Operation of Prior Informed Consent, Rome.
2. Main source used for this section: van der Wulp, H.P. (1993), Prevention and Elimination of Obsolete Pesticide Stocks in Developing Countries. Published for GLOBE by AIDEnvironment, Amsterdam.
3. The Basel Convention states that shipment of obsolete pesticides is only allowed if there are no local solutions. Shipment should in principle be to the nearest appropriate place. Since there are no appropriate disposal facilities in most developing countries, shipment out of these countries is the only solution.
4. In July 1994, FAO has started a two-year project for the prevention and disposal of obsolete pesticides stocks in Africa and the Near East. Under this project, a panel of experts will be established jointly by FAO, UNEP and WHO. This panel will evaluate relevant disposal methods on safety and environmental soundness. FAO is currently taking the line that, as long as other methods are not being recommended by the panel of experts, high temperature incineration in a dedicated incinerator remains the only acceptable disposal method. The underlying principle is that donors should not use or recommend disposal methods which would not be regarded as acceptable in their own country.
5. Presently, there is in principle only one safe solution for the disposal of obsolete pesticides and that is incineration in a high-temperature rotary-kiln incinerator. Either obsolete pesticides are shipped to a dedicated incinerator in an industrialised country, or a mobile incinerator is brought to the country concerned. However, mobile incinerators are only cost-effective for quantities exceeding 1 000 tonnes and require intensive technical and logistic support. Moreover, there is no experience yet with mobile incinerators in developing countries. For practical reasons it would not be feasible to ship all obsolete pesticides to OECD countries. In particular for powder formulations with 2-5 per cent active ingredient this would be very costly. On the other hand, it should be noted that shipping all pesticides from Africa would cost about \$80-120 million, which is an amount comparable to the clean-up costs of a single contaminated site in Rotterdam, The Netherlands. For an overview of disposal methods and further information concerning the problem of obsolete pesticides, reference is made to Annex 3: Selected Publications, Pesticide Management: Technical Guidelines.



*Annex 3*

**SELECTED PUBLICATIONS AND SOURCES FOR  
FURTHER INFORMATION**

The following is a selection of publications and information sources related to the subject of pest and pesticide management in developing countries.

**I. Publications**

The following list is not meant to be exhaustive and the inclusion of a document on this list does not indicate that it is being recommended over a document that is not listed.

***Integrated pest management***

- Botrell, D.G. (1979), *Integrated Pest Management*, Council on Environmental Quality, US Government Printing Office, Washington, DC.
- Burn, A.J., Coaker, T.H. and Jepson, P.C. (1987), *Integrated Pest Management*, Academic Press.
- FAO, *Reports of the FAO/UNEP Panel of Experts on Integrated Pest Control*, Rome.
- Flint, M.L. and van den Bosch, R. (1981), *Introduction to Integrated Pest Management*, Plenum Press.
- Japan International Cooperation Agency (JICA) (1991), *Joint Evaluation Report on Food Crop Protection Project Phase II*, Joint publication of JICA and the Ministry of Agriculture of Indonesia, Tokyo.
- Kenmore, P.E. (1991), *Indonesia's IPM — A Model for Asia*, FAO Inter-country Programme for Integrated Pest Control in Rice in South and South-East Asia, Manila.
- Kiss, A. and Meermans, F. (1991), *Integrated Pest Management and African Agriculture*, World Bank Technical Paper No. 142, Washington.

**Pesticide management: general background information**

- FAO (1990), *International Code of Conduct on the Distribution and Use of Pesticides* (amended version), Rome.
- FAO (1994), *Provisional Guidelines on the Tender Procedures for the Procurement of Pesticides*, Rome (in preparation).
- ILO (1991), *Safety and Health in the Use of Agrochemicals: A Guide*, Geneva.
- UN, *Consolidated List of Products whose Consumption and/or Sale Have Been Banned, Withdrawn, Severely Restricted or not Approved by Governments*, United Nations Publications, New York.
- WHO (1990), *Public Health Impact of Pesticides Used in Agriculture*, Geneva.
- WHO/IPCS (1993), *The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 1992-1993*, WHO/IPCS, Geneva.

**Pesticide management: situation in developing countries**

- FAO (1989), *Report of the Workshop and Symposium on Strengthening Pesticide Regulations*, Joint publication of FAO, the Asian Development Bank and the US Environmental Protection Agency, Manila.
- FAO (1989), *Report of the Sub-regional Workshop on Pesticide Management for Western Africa, 4-8 September 1989, Accra*, FAO Regional Office for Africa, Accra.
- FAO (1991), *Report of the Sub-regional Workshop on Pesticide Management for SADCC Member States, 20-27 May 1991, Harare*, FAO Regional Office for Africa, Accra.
- FAO (1992), *Report of the Sub-regional Workshop on the Implementation of the Code of Conduct on the Distribution and Use of Pesticides for Eastern African Countries, 7-12 December 1992, Arusha*, FAO Regional Office for Africa, Accra.
- FAO (1993), *Report of the Sub-regional Workshop on the Implementation of the Code of Conduct on the Distribution and Use of Pesticides for Central African Countries, 25-30 January 1993, Brazzaville*, FAO Regional Office for Africa, Accra.

**Pesticide management: technical guidelines**

- FAO (1991), *Guidance for Governments, Joint FAO/UNEP Programme for the Operation of Prior Informed Consent*, Rome.
- GLOBE/AIDEnvironment (1993), *Prevention and Elimination of Obsolete Pesticides Stocks in Developing Countries*, Amsterdam.

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The FAO Plant Protection Service has published the following Technical Guidelines for:

- a) *Legislation on the Control of Pesticides* (1989).
- b) *The Registration and Control of Pesticides* (1985), plus Addenda to the *Guidelines for the Registration and Control of Pesticides* (1988).
- c) *The Initial Introduction and Subsequent Development of a Simple National Registration and Control Scheme* (1991).
- d) *Environmental Criteria for the Registration of Pesticides* (Revised version, 1989).
- e) *Efficacy Data for the Registration of Pesticides for Plant Protection* (1985).
- f) *Pesticide Residue Trials to Provide Data for the Registration of Pesticides and the Establishment of Maximum Residue Limits* (1986).
- g) *Post-Registration Surveillance and other Activities in the Field of Pesticides* (1988).
- h) *The Registration of Biological Pest Control Agents* (1988).
- i) *Good Labelling Practice for Pesticides* (Revised version, 1991).
- j) *Pictograms for Use on Agrochemical Labels* (1988: In co-operation with GIFAP).
- k) *The Packaging of Pesticides* (Revised version, 1991).
- l) *Retail Distribution of Pesticides with Particular Reference to Storage and Handling at the Point of Supply to Users in Developing Countries* (1988).
- m) *Good Practices for Ground and Aerial Application of Pesticides* (1988).
- n) *Personal Protection when Working with Pesticides in Tropical Climates* (1990).
- o) *The Disposal of Waste Pesticide and Pesticide Containers on the Farm* (1985); under revision.
- p) *Disposal of Bulk Quantities of Unwanted Pesticides* (in preparation).

The International Group of National Association of Manufacturers of Agrochemical Products (GIFAP) has published Guidelines for:

- a) *Emergency Measures in Cases of Pesticide Poisoning* (1984).
- b) *Quality Control of Pesticides* (1985).
- c) *Safe Transportation of Pesticides* (1987).
- d) *Avoidance, Limitation and Disposal of Pesticide Waste on the Farm* (1987).
- e) *Safe Warehousing of Pesticides* (1988).
- f) *Personal Protection when Using Pesticides in Hot Climates* (1989).
- g) *The Safe and Effective Use of Pesticides* (1989).

- h) *Writers of Pesticide Labels and Literature* (1989).
- i) *Disposal of Unwanted Pesticide Stocks* (1991).

### **Pesticide management: information on specific pesticides**

- FAO, *FAO Specifications for Plant Protection Products* (a continuing series of documents providing chemical and physical specification of individual pesticides), Rome.
- WHO/IPCS, *Environmental Health Criteria Documents* (a continuing series of documents on the environmental aspects of specific pesticides and other chemicals), Geneva.
- WHO/IPCS, *Health and Safety Guides* (a continuing series of documents on the health and safety aspects of specific pesticides and other chemicals), Geneva.
- WHO/IPCS, *International Chemical Safety Cards* (a continuing series of one-page information on the safe handling, use and disposal of specific pesticides, including medical instructions and instructions on how to clean up spills), Geneva.

### **Pesticide management: donor policies**

- EC (1993), *Environment Manual; Environmental Procedures and Methodology Governing Lomé IV Development Co-operation Projects: Checklist 16 for Pesticides and Fertiliser Projects*, Commission of the European Communities, Brussels.
- FAO (1992), *Field Programme Circular, the Use of Pesticides in FAO Projects*, Plant Protection and Production Service, Rome.
- FAO (1993), *Review of Pesticide Policies of Major Donor Institutions*, Report to the FAO/UNEP Panel of Experts on IPM, Rome.
- GLOBE (1993), *Prevention and Elimination of Obsolete Pesticide Stocks in Developing Countries*, Global Legislators Organisation for a Balanced Environment. Prepared and published by AIDEnvironment, Amsterdam.
- OECD (1993), *DAC Guidelines on Aid and Environment No 5: Guidelines for Aid Agencies on Chemicals Management*, OECD, Paris, 1993.
- UNCED (1992), Agenda 21, Chapter 14 (Section I), *Integrated Pest Management and Control in Agriculture*; and Chapter 19, *Environmentally Sound Management of Toxic Chemicals*. Adopted on 14 June 1992, Rio de Janeiro.
- USAID (1980), *US Code of Federal Regulations: Agency for International Development (22 CFR, Part 216): Environmental Procedures*, Washington, DC.
- USAID (1991), *Pest Management Guidelines of the Agency for International Development*, Washington, DC.

World Bank (1991), *Guidelines for the Procurement of Pesticides*, Washington, DC.

World Bank (1992), *Operational Directive 4.03: Agricultural Pest Management*, Washington, DC.

World Bank (1993), *Guidelines and Best Practice: Agricultural Pest Management*, Washington, DC.

## **II. Magazines**

*Pesticide News*, Quarterly journal and its associated Current Research Monitor, which lists details of relevant research from over 200 scientific journals. Published by the Pesticide Trust, London.

*Global Pesticide Campaigner*, Subscription journal published by the Pesticide Action Network (PAN) North America, San Francisco.

*The ILEIA Newsletter*, Newsletter published by the Information Centre for Low-External Input and Sustainable Agriculture (ILEIA), Leusden (The Netherlands).

*The IPM Practitioner*, Subscription journal published by the Bio-Integral Resource Center, Berkeley, California.

## **III. Information Sources**

Selected addresses where most of the above information can be obtained. However, the list does not represent the full range of institutions and organisations involved in pest and pesticide management.

### ***International organisations***

FAO (for publications)  
Publications Division  
Via delle Terme di Caracalla  
00100 Rome  
ITALY

FAO (for co-ordination matters)  
Chief Plant Protection Service  
Via delle Terme di Caracalla  
00100 Rome  
ITALY

ILO (for publications)  
Publications  
CH-1211 Geneva 22  
SWITZERLAND

ILO/International Occupational Safety  
and Health Information Centre  
CH-1211 Geneva 22  
SWITZERLAND

IPCS (International Programme  
on Chemical Safety)  
World Health Organisation  
20, avenue Appia  
CH-1211 Geneva 27  
SWITZERLAND

World Bank  
Agricultural Policies Division  
1818 H Street, N.W.  
Washington, DC 20433  
UNITED STATES

OECD  
Development Co-operation Directorate  
2, Rue André Pascal  
75775 Paris Cedex 16  
FRANCE

OECD  
Environment Directorate  
Environmental Health and Safety  
Division  
2, rue André Pascal  
75775 Paris Cedex 16  
FRANCE

UNEP/IE (Industry and  
Environment Office)  
World WIDE Network (Women in  
Development and Environment)  
Tour Mirabeau,  
39-43 quai André-Citroën  
75739 Paris Cedex 15  
FRANCE

UNEP/IRPTC (International Register  
of Potentially Toxic Chemicals)  
Palais des Nations  
CH-1211 Geneva 10  
SWITZERLAND

### ***Private organisations and NGOs***

AIDEnvironment  
Donker Curtiusstraat 7/523  
1051 JL Amsterdam  
THE NETHERLANDS

Bio-Integral Resource Center  
PO Box 7414  
Berkeley, California, 94707  
UNITED STATES

GIFAP  
Avenue Hamoir, 12  
1180 Brussels  
BELGIUM

ILEIA  
Kastanjelaan 5  
PO Box 64  
3830 AB Leusden  
THE NETHERLANDS

Pesticide Action Network  
Asia and the Pacific  
PO Box 1170  
10850 Penang  
MALAYSIA

Pesticide Action Network  
North America Regional Center  
965 Mission Street, N.514  
San Francisco, California, 94103  
UNITED STATES

The Pesticide Trust  
23 Beehive Place  
London, SW9 7QR  
UNITED KINGDOM