Reducing and Eliminating the use of Persistent Organic Pesticides

Guidance on alternative strategies for sustainable pest and vector management

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Fold-out flowchart on the backflap

Preface

Persistent Organic Pollutants (POPs) are chemicals that persist in the environment, accumulate in high concentrations in fatty tissues and are bio-magnified through the food-chain. Hence they constitute a serious environmental hazard that comes to expression as important long-term risks to individual species, to ecosystems and to human health. POPs chemicals may cause cancer and disorders in the reproductive and immune systems as well as in the developmental process. They constitute a particular risk to infants and children who may be exposed to high levels through breast-milk and food.

During the last two decades much attention has been given to this group of substances at the international level after it became apparent that they are transported through the environment across borders. Individual countries alone are unable to control the environmental pollution from such border-crossing substances and critical concentrations have been reached in some regions, even in places where they have never been produced or used. Negotiations on a global, legally binding instrument to reduce and/or eliminate releases of POPs started in Montreal, Canada in 1998 under the auspices of UNEP. In May 2001 126 countries and the EU agreed and adopted the text of this global treaty, referred to as the Stockholm Convention on Persistent Organic Pollutants.

The decision by the UNEP Governing Council in 1997 to initiate these negotiations followed recommendations by the Intergovernmental Forum on Chemical Safety (IFCS) for international actions to reduce the risks to human health and the environment arising from a first list of twelve POPs. The IFCS recommendations were also endorsed by the World Health Assembly (WHA) in May 1997. Through the adoption of Resolution 50.13 (promotion of chemical safety, with special attention to persistent organic pollutants) the Assemby requested the Director-General of the World Health Organization, *inter alia*, to continue efforts to enhance technical cooperation with Member States for the determination of their capacity-building needs, and for the implementation of programmes for the management of chemical risks, in collaboration with participants of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC) and other organizations.

In 1997 the Governing Council further requested UNEP to initiate a number of immediate actions including the improvement of access to information and expertise on alternatives to POPs. Information exchange and education programmes should enable governments of Member States to make their own decisions on replacing POPs with alternatives. In this context UNEP was requested to develop guidance on the selection of alternatives to POPs pesticides.

In response to these requests, this guidance document has been prepared jointly by the United Nations Environment Programme (through its Chemicals unit), the Food and Agriculture Organization of the United Nations (through the Global IPM Facility) and the World Health Organization (through the Secretariat of the Panel of Experts on Environmental Management for Vector Control - PEEM). It is a guide for the onset of national efforts to assess, select and develop alternative strategies to POPs pesticides in line with the basic principles for more sustainable practices in pest and vector control. It takes into account various aspects of public health, the environment and agriculture with the objective of fostering holistic and integrated approaches while ensuring that strategies of different sectors are compatible, coordinated and mutually reinforcing. Implementation of such strategies will also be promoted through regional training workshops, pilot studies and support to develop and implement national action plans.

This document is part of a package of UNEP products aimed to facilitate and support the development of initiatives at all levels to reduce and/or eliminate releases of POPs. These products are all available through the POPs homepage at http:// www.chem.unep.ch/pops/. Drafts of this document were reviewed by a large number of experts both from within and outside of the three UN agencies, whose valuable and constructive comments and contributions to both contents and structure of the draft text are gratefully acknowledged. Special thanks are extended to Johan Mörner, who produced the first draft manuscript, and to Barbara Dinham, Hermann Waibel and Peter Kenmore who provided substantial inputs into the document. Robert Bos (WHO), Marjon Fredrix (FAO) and Agneta Sundén Byléhn (UNEP) were responsible for its final development and editing.

Introduction

Persistent Organic Pollutants (POPs) are chemicals that:

- are extremely stable and persist in the environment,
- bio-accumulate in organisms and food chains,
- are toxic to humans and animals and have chronic effects such as disruption of reproductive, immune and endocrine systems, as well as being carcinogenic, and
- are transported in the environment over long distances to places far from the points of release.

With the evidence that POPs are transported to regions where they have never been used or produced, the international community decided in 1997 to work towards the establishment of a Convention that will serve as an international, legally binding instrument to reduce and/or eliminate releases of twelve POPs, as identified in the UNEP Governing Council Decision 19/ 13C. The initial list of POPs contains the nine pesticides that are listed in the accompanying box. The decision also includes PCBs (mainly used in electrical equipment) and two combustion by-products, dioxins and furans. The UNEP Governing Council also requested that criteria and a procedure be developed to identify further POPs as candidates for international action. This request has been complied with and more substances are therefore likely to be included in the list.

The nine pesticides in the initial list of the Stockholm Convention on POPs
aldrin toxaphene DDT chlordane dieldrin endrin HCB heptachlor mirex

Pesticides now classified as POPs started to be used on a large scale after World War II in agriculture and for disease vector control. Crop protection and disease vector control strategies became dominated by the application of these pesticides. Ecological science and thinking, the basis for earlier efforts to control pests and disease vectors, lost its prominence.

The control of disease vectors (such as malaria mosquitoes) by pesticides saved the lives of millions of people. The negative impact of pesticides on agro-ecosystems as well as on the environment and human health started, however, to become increasingly evident in the 1950s. A landmark in public awakening was the publication, in 1962, of *Silent Spring*, in which Rachel Carson eloquently warned against continued unrestricted use of chlorinated pesticides, in particular DDT. Evidence continued to mount in the following decades supporting her fundamental point: pest control which ignores ecology not only fails (see chapter 2), but it creates additional problems affecting health and environment (Carson, 1962).

Effects of POPs on Health and Environment

Persistence, Transport and Bio-accumulation

POP pesticides and their residues are now found as pollutants all over the world. Being semi-volatile, they are transported over long distances. This volatility is greater in tropical than in moderate or cold climates, and eventually they end up being trapped in the coldest parts of the planet. High levels are thus detected in organisms in the Arctic area, where few if any pesticides were ever used. Examples of residue levels found in northern ecosystems are given in table A1 in annex 1. It has also been noted that such levels, for example as detected in breast milk, remain unchanged, or even rise, in regions where use was banned decades ago.

The persistent nature of POP pesticides is demonstrated by their slow rate of degradation in soil, particularly in cold climates. Their half-life sometimes extends over more than a decade (table A2 in annex 1). Several metabolites of POP pesticides are stable and toxic as well.

Another property of these compounds is their solubility in fatty substances and tissues, which leads to their accumulation in body fat. Concentrations will further increase hundreds of times through food webs (biomagnification, see figure 1). At the higher consumer levels in such webs harmful effects such as egg thinning have been observed. These are thought to reflect a broader range of more insiduous disruptive impacts on vertebrate endocrine systems.



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