Environmental and Health Impacts of Pesticides and Fertilizers and Ways of Minimizing Them

Envisioning A Chemical-Safe World

About the Synthesis Report and Comprehensive Compilation of Scientific Information on Pesticides and Fertilizers











Contents

About ii

About the Synthesis Report and Comprehensive Compilation of Scientific Information on Pesticides and Fertilizers 1

Rationale for the Synthesis Report on the Environmental and Health Impacts of Pesticides and Fertilizers and Ways to Minimize Them 1
The UNEA mandate 1
Goal and objectives of the synthesis report 2
Process of elaboration 2
Structure of the Comprehensive Compilation of Scientific Information 3
Priority actions and transformative actions to minimize adverse impacts 3

Key findings and options for action 5

Key findings 5
Options for priority actions 7

References 8

Annex 10

Acknowledgements 10
List of Contributors to the Comprehensive Compilation 10

1 Global drivers, actors and policies affecting pesticides and fertilizer use

2 Status and trends of pesticide use

3 The regulatory and policy environment for pesticide management

4 Environmental and health effects of pesticide use

5. The environmental, human health and economic impacts of pesticides

6 Current pesticide risk reduction and risk management

7 Status and trends of fertilizer use

8 The regulatory and policy environment of fertilizer management and use

9 Environmental and health effects of fertilizer use

10 The impact of fertilizer use

11 Current fertilizer risk reduction and risk management

12 Transformative actions to minimize the adverse impacts of pesticide and fertilizers

List of Figures

Figure Report development structure. 3

About

In December 2017, Resolution 4 of the 3rd Session of the United Nations Environment Assembly (UNEA 3) requested "the Executive Director to present a report on the environmental and health impacts of pesticides and fertilizers and ways of minimizing them, given the lack of data in that regard, in collaboration with the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO) and other relevant organizations by the fifth session of the United Nations Environment Assembly". In response to this request, UNEP published a *Synthesis Report on the Environmental and Health Impacts of Pesticides and Fertilizers and Ways to Minimize Them*[1] in February 2022 (United Nations Environment Programme [UNEP] 2022).

The overall goal of the synthesis report is to provide the information base to enable other advocacy actions to be taken by stakeholders to minimize the adverse impacts of pesticides and fertilizers. Specific objectives of the synthesis report are to:

- Update understanding of current pesticide and fertilizer use practices;
- Present major environmental and health effects of pesticides and fertilizers, during their life cycle, and identify key knowledge gaps;
- Review current management practices, legislation and policies aimed at reducing risks in the context of the global chemicals, environmental and health agenda;
- Identify opportunities to minimize environmental and health impacts, including proven and innovative approaches.

1 The Synthesis report is available at https://www.unep.org/resources/report/environmental-and-health-impacts-pesticides-and-fertilizers-and-ways-minimizing.



About the Synthesis Report and Comprehensive Compilation of Scientific Information on Pesticides and Fertilizers

Rationale for the Synthesis Report on the Environmental and Health Impacts of Pesticides and Fertilizers and Ways to Minimize Them

We live in a globalized world, where the needs and demands of a growing population and associated megatrends (e.g., urbanization and the growing global middle class) shape the production, trade and consumption of agricultural crops and other goods and services for which pesticides and fertilizers are used in significant quantities. The global demand for, and production and use of, pesticides and fertilizers have increased steadily during the past decades and are projected to continue growing. Unlike most industrial chemicals, pesticides and fertilizers (both inorganic and organic) are deliberately applied in the environment to provide specific beneficial functions. This creates potential risks to the environment and health.

A wealth of studies and reports address the adverse environmental and human health impacts of pesticides and fertilizers. The adverse impacts of pesticides are partly due to the fact that these chemicals are designed to be inherently toxic. While they are designed to eliminate unwanted insects, plants and other living organisms, they may also adversely affect non-target organisms. In the case of fertilizers, adverse impacts mainly result from their release into the environment and their effects on ecosystems, which are largely due to nutrient loss through overuse or inefficient use. Despite many published scientific studies, however, there is a lack of consolidated knowledge about the adverse impacts of pesticides and fertilizers at the global level.

The UNEA mandate

In December 2017, Ministers of Environment convened for the 3rd Session of the United Nations Environment Assembly (UNEA 3) under the theme "Toward a pollution-free planet". UNEA 3 featured resolutions and pledges promising to improve the lives of people across the globe by cleaning up their air, land and water. Resolution 3/4 on Environment and Health addressed topics relevant to the environment and health interface, including: chemicals and waste, the climate, biodiversity, antimicrobial resistance, and sustainable consumption and production.

In specifically addressing pesticides and fertilizers and related knowledge gaps, UNEA Resolution 3/4 invited "Member States to increase

awareness of the risks posed to human, animal and environmental health from the improper use of fertilizers and pesticides and to promote measures to address them". More specifically, the resolution requested "the Executive Director to present a report on the environmental and health impacts of pesticides and fertilizers and ways of minimizing them, given the lack of data in that regard, in collaboration with the World Health Organization, the Food and Agriculture Organization of the United Nations and other relevant organizations by the fifth session of the United Nations Environment Assembly".

Goal and objectives of the synthesis report

In February 2022, UNEP published a Synthesis Report on the Environmental and Health Impacts of Pesticides and Fertilizers and Ways to Minimize Them in response to the mandate in UNEA Resolution 3/4. Its overall goal is to provide the information base to enable other advocacy actions to be taken by stakeholders to minimize the adverse impacts of pesticides and fertilizers. Specific objectives of the Synthesis Report are to:

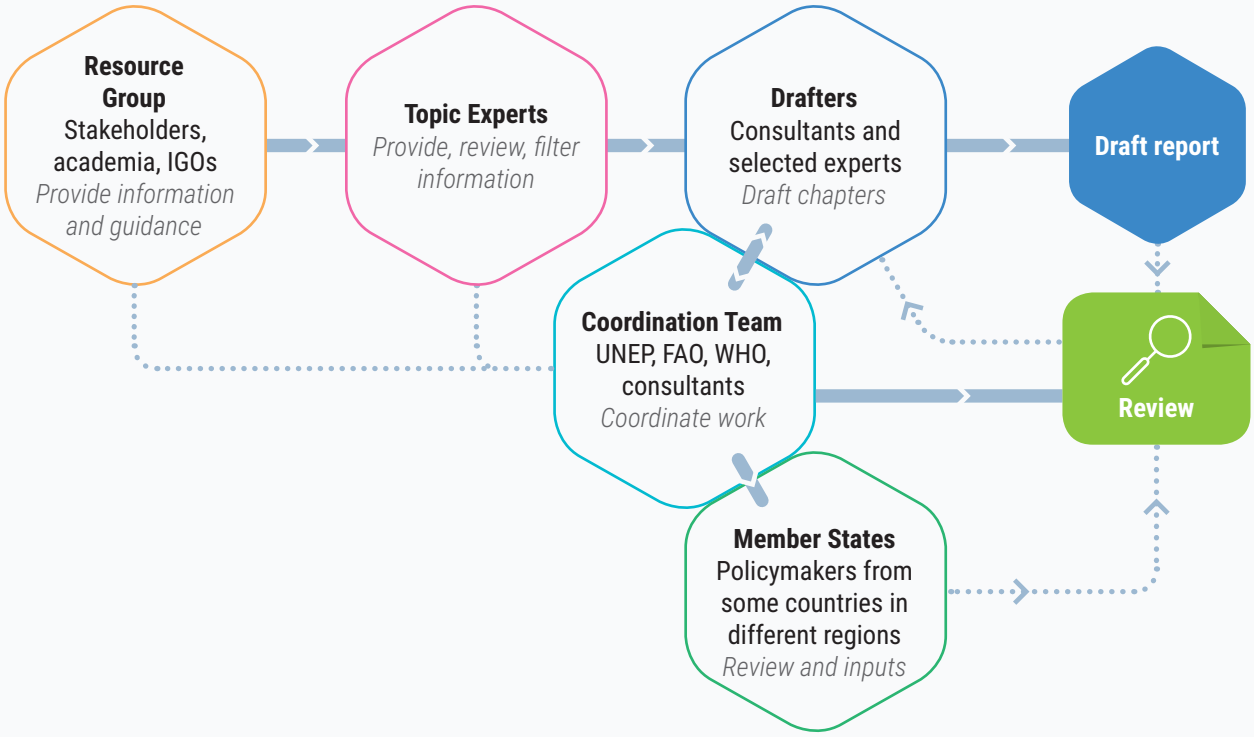
- Update understanding of current pesticide and fertilizer use practices;
- Present major environmental and health effects of pesticides and fertilizers, during their life cycle, and identify key knowledge gaps;
- Review current management practices, legislation and policies aimed at reducing risks in the context of the global chemicals, environmental and health agenda;
- Identify opportunities to minimize environmental and health impacts, including proven and innovative approaches.

Process of elaboration

A Comprehensive Compilation of Scientific Information (Comprehensive Compilation) was developed by UNEP in collaboration with the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO) and a wide range of experts and stakeholders (Figure A). Two physical and five online consultations took place between late 2018 and mid 2020 with policymakers from countries in different regions, experts on pesticides and fertilizers, including the FAO/WHO Joint Meeting on Pesticide Management, and specialists from intergovernmental and non-governmental organizations and the private sector. Over 200 experts representing academia, research institutes, civil society, industry and intergovernmental organizations, as well as subject matter specialists, contributed to the drafting and development of the Comprehensive Compilation.

The Comprehensive Compilation was developed was to support a systematic process of knowledge compilation and assessment, reviews were conducted on the status of use and regulatory aspects of pesticides and fertilizers and the scientific literature on their environmental and health impacts. Various detailed technical assessments were also conducted, including a review of epidemiological studies on the health effects of pesticides and fertilizers, a compilation of poison centre statistics, and an assessment of fiscal policies for pesticides and fertilizers. The Synthesis Report was prepared based on the information and findings of the Comprehensive Compilation.

Figure Report development structure.



Structure of the Comprehensive Compilation of Scientific Information

This Comprehensive Compilation is separated into individual "Chapters" that can be categorized over four parts. Part I provides the shared context of both the synthesis report and the Comprehensive Compilation and introduces global trends, actors and policies that shape pesticide and fertilizer demand and use. Parts II and III discuss in more depth specific aspects of pesticides and fertilizers, respectively. They are structured similarly and present: demand status and trends; the regulatory and policy environment; environmental and health impacts; current risk management; and options for action to reduce environmental and health risks and address identified knowledge gaps. Part IV describes options for transformative actions to minimize the adverse impacts of pesticides and fertilizers. A Summary for Policymakers presents the main findings of the Synthesis Report and the Comprehensive Compilation and in a concise form.

Priority actions and transformative actions to minimize adverse impacts

Stakeholders participating in the intersessional process on the Strategic Approach to International Chemicals Management (SAICM) and chemicals and waste management beyond 2020 chose United for a Chemical-safe Future as the theme of the fifth International Conference on Chemicals

Management (ICCM5). To achieve a chemical-safe future with regard to pesticides and fertilizers, the Synthesis Report and the Comprehensive Compilation describe both priority actions and transformative actions, coupled with supporting measures to ensure that the transition to a chemical-safe future is just and leaves no one behind. The actions proposed should help achieve a sustainability scenario for the use of pesticides and fertilizers, rather than a business-as-usual scenario that would perpetuate an unsustainable status quo.

Regarding priority actions (or management reform actions), the Comprehensive Compilation discusses in Parts II (Pesticides) and III (fertilizers) opportunities which focus on methodologies, tools, approaches and policies that directly strengthen management.

In addressing transformative actions, Comprehensive Compilation talks about ways to fundamentally change how pesticides and fertilizers are produced, used and managed through concerted action by a wide range of stakeholders in the agri-food system and in value chains. These stakeholders include consumers, the agricultural inputs industry, the food industry, farmers' associations and agricultural research institutions, with policymakers playing a particularly important role.

Together we can achieve a world without adverse impacts from pesticides and fertilizers by taking ambitious and urgent action

Key findings and options for action

The global goal to minimize adverse impacts of chemicals and waste by 2020 has not been achieved for pesticides and fertilizers. Business-as-usual is not an option.

Key findings

1

Global demand, production and use of pesticides and fertilizers have expanded steadily during the past decades (Oliver 2018; FAO 2021; International Fertilizer Association 2021). Combined global sales values continue to grow at about 4.1 per cent per year and are projected to reach United States dollars (USD) 309 billion[1] by 2025 (Grand View Research 2017).

2

Demand for food, hence crops, goods and services, is fuelling the production and use of pesticides and fertilizers (Bodirsky et al. 2015; Organisation for Economic Co-operation and Development and FAO 2018). Demand for crops used for animal feed, fibres, fuels and feedstocks is also growing (International Feed Industry Federation 2021).

3

Positive associations between exposure to pesticides and certain health outcomes have been established, including acute and long-term effects (Prüss-Ustün et al. 2016; Ntzani et al. 2020).

2 In this report the term billion is defined based on the short scale as one thousand million or 109 (ten to the ninth power).



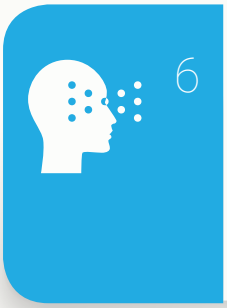
4

Pesticides and their degradation products are ubiquitous in the environment, including soils, sediments and surface and groundwater, often detected at levels exceeding environmental standards or guidelines leading to serious environmental as well as health impacts (Vulliet *et al*. 2014; Elibariki and Maguta 2017; Guida *et al*. 2018; Hvězdová *et al*. 2018; Pietrzak *et al*. 2019).



5

Adverse impacts of fertilizers are mainly caused by their excessive and inefficient use resulting in nutrient losses to the environment, drinking water contamination and eutrophication of freshwater systems and coastal zones (Sutton *et al*. 2013; FAO 2015; Kopittke *et al*. 2019). Some fertilizers also impact human lives as a result of unsafe storage practices (Pittman *et al*. 2014) and the growth of toxic algae in nutrient rich waterways (Kubickova *et al*. 2019; Chorus and Walker 2021).



6

Knowledge gaps still exist that hamper a full understanding of some of the mechanisms and processes leading to the adverse impacts of pesticides and fertilizers, together with the effectiveness of some control measures. Attention to the establishment of sustainable mechanisms for the collation and regular review of existing data on manufacture, sales, use, environmental concentrations and impacts is required.

Options for priority actions

Priority transformative actions have been identified through consultations with government experts, independent scientists, experts from intergovernmental organizations, and other stakeholders from the public and private sector. Identification of these transformative actions is based on the impact they are expected to have on the sustainability of pesticide and fertilizer use, the degree to which they would minimize adverse impacts, and their interconnection with the SDGs and associated global policies.

Joint commitment by all stakeholders at global level is required in order to achieve the impact expected. Deliberations at UNEA and by other international bodies to identify specific roles and responsibilities of stakeholders in implementing the identified priorities provide the pathways to achieve the goals. These are further elaborated in detail in Chapter 12.

The priority actions to strengthen pesticide and fertilizer management are key conclusions identified through the overall evaluation and analysis undertaken. They present opportunities which focus on methodologies, tools, approaches and policies that directly strengthen pesticide and fertilizer management. They are further elaborated in Chapter 6 and Chapter 11.

Priority transformative actions to strengthen pesticide and fertilizer management

- Incentivize healthy and sustainable consumer choices and consumption;
- Fundamentally change crop management and adopt ecosystem-based approaches;
- Promote circularity and resource efficiency;
- Use economic instruments to create a level playing field for greener products and approaches;
- Adopt integrated and life cycle approaches for sound pesticide and fertilizer management;
- Strengthen standards and adopt corporate policies for sustainable supply chain management.

Priority actions to strengthen pesticide management

- Strengthen control of pesticide distribution and use and enforcement of relevant legislation;
- Scale up development of both new and existing international pesticide evaluations;
- Minimize or eliminate the risks posed by Highly Hazardous Pesticides;
- Strengthen post-registration monitoring of pesticides and their effects;
- Prioritize development of and access to low-risk pesticides and bioprotectants;
- Address the trade in substandard, illegal and counterfeit pesticides;
- Support adoption of extended product responsibility by all pesticide manufacturers and traders.

Priority actions to strengthen fertilizer and nutrient management

- Ensure comprehensive national policies for quality control of fertilizers;
- Fill information and knowledge gaps for effective fertilizer and nutrient management;
- Strengthen policies globally to support sustainable and safe use of fertilizers;
- Scale up training of all relevant stakeholders in fertilizer and nutrient management;
- Ensure that suitable and affordable fertilizers are accessible, particularly in low and middle income countries.

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Annex

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