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Highly Hazardous Pesticides (HHPs) in Agro-industrial and Smallholder Farming Systems in Kenya

Farms in the global South show heavy use of pesticides such as herbicides, insecticides and fungicides. Some of these substances are banned in Switzerland and the European Union but are often produced and exported from there. Our messages draw on research findings from Kenya. They make the link to international conventions, highlight alternatives to pesticide-intensive agricultural practices, and call for phasing out "highly hazardous" substances in line with human rights and the precautionary principle.

KEY MESSAGES

- Highly hazardous pesticides (HHPs) should be withdrawn from the market, starting with WHO Class I substances and organophosphates, in accordance with the precautionary principle.
- Double standards of pesticide regulation among different countries should be eliminated and international conventions implemented.
- Training and incentives for pesticide-free farming should be promoted, such as use of push–pull technology for crop protection.

Picture:
Pesticide application on a horticultural farm near Mount Kenya. © H. Augstburger

Empty agrochemical bottles are often not disposed of properly. They are either used as household tools such as ladles or dumped in fields, rivers, or people's backyards. © J. Jacobi

In 2007, when the last information on pesticide quantities was published by Kenya's Pest Control Product Board, the country purchased 8,749 metric tons of pesticides – including herbicides, insecticides, and fungicides – worth over USD 34 million[1]. The prices of agrochemicals have decreased since then, yet Kenya's spending on pesticides has risen. It paid USD 126.32 million for pesticides in 2013, a 270% increase in ten years[2].

In 2009, 62 different pesticide products with 36 active ingredients were used in the Kenyan vegetable production[3]. Today, there are 1,140 different products with 367 active ingredients registered for use in Kenya[4]. The most commonly imported active ingredients are Glyphosate, Imidacloprid and Mancozeb, all three listed as "highly hazardous pesticides" (HHP) by the Pesticide Action Network, a group of over 600 non-governmental organizations working in the field of pesticides. HHPs are either acutely toxic, have long-term toxic effects, are endocrine disruptors, pose a threat to the environment, or are known to cause a high incidence of severe or irreversible adverse effects (Figure 1).

CRITERIA FOR "HIGHLY HAZARDOUS PESTICIDES"	ACCORDING TO
High acute toxity (Class 1a, 1b, or "fatal if inhaled")	World Health Organization Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
Long term toxic effects (kown or presumed carcinogenic, mutagenic or reproductive toxicant)	International Agency for Research on Cancer United States Environmental Protection Agency GHS
Endocrine disruptor (suspected or potential)	GHS EU prority list
High environmental concern (very persistent or very bio accumulative or very toxic to aquatic organisms)	UN Stockholm Convention UN Montreal Protocol
Hazard to ecosystem services (highly toxic for bees)	United States Environmental Protection Agency
Known to cause a high incidence of severe or irreversible adverse effects	UN Rotterdam Convention

Figure 1: Criteria for Highly Hazardous Pesticides and reference organisation or convention

Natural alternatives are available in the region: Kenya has a considerable industry of bio-pesticides based on Chrysanthemum flowers[5]. However, the products are almost completely exported, while more harmful synthetic pesticides are imported. Local use of Pyrethrin instead of imported synthetic substances could be promoted, fostering the national alternative industry. However, as Pyrethrin is toxic to aquatic organisms, development of pesticide-free farming should remain the higher-priority longer-term goal.

Agro-industrial farms use many pesticides, including products considered highly hazardous

In a study from the north-western Mount Kenya region within the Swiss r4d programme, researchers analysed three agro-industrial farms that produce vegetables for European supermarkets. All are certified members of the "Global G.A.P." initiative, for "good agricultural practices". Still, they used HHPs. An average of 40.8 kg of pesticides was applied per hectare and cultivation cycle (four months for broccoli, five months for beans), with spraying up to 15 times. For comparison, 2.75 kg of pesticides are applied per hectare globally each year. Bhutan promotes organic agriculture and uses 0.12 kg. Of 53 products found on the Kenyan agro-industrial farms, only 17 are permitted in Switzerland; 36 products contain listed HHPs. Examples include the products "Match", containing Lufenuron, a bio-accumulative, persistent in water, soils or sediments, highly toxic to aquatic organisms; "Escort 19 EC", containing Emamectin benzoate, highly toxic to bees and aquatic organisms, persistent in water, soils, or sediments, and "Pentagon" conntaining Lambda-cyhalothrin, acutely toxic to humans, suspected endocrine disruptor, and highly toxic to bees.

Smallholder farmers use less pesticides, but face acute exposure risks

Three smallholder farms in the same area applied 5.8 kg of pesticides on average per hectare and cultivation cycle (four months for beans, five for potato), spraying up to eight times. While this amount is seven times less than the agro-industrial farms nearby, it is still twice the global average. Eleven products were identified, eight of which contain HHPs; of these, five substances are banned in Switzerland and two in the EU.

For instance the product "Tigger" contains Chlorpyrifos, an organophosphate linked to reduced IQs, deficits in memory and attention, and autism in children[6,7].

According to over 100 interviews conducted in the study area, there are many local providers offering pesticides that lack proper instructions, quality, and safety information[8]. Due to their accessibility, they are widely used by smallholder farmers, who often do not possess sufficient knowledge about pesticide application as compared to the managers of agro-industrial farms, and often do not use protective gear[9]. Smallholders also use the empty pesticide containers for miscellaneous household storage, and keep full bottles of pesticides in the home, putting themselves and their families at significant risk[9].

Unwanted side effects

Pesticide use can affect water quality and non-targeted organisms such as plants, fish, insects, amphibians, reptiles, or birds[10,11,12]. Primary paths of human exposure to pesticides are through inhalation, ingestion, dermal absorption, or absorption through the eyes[13]. These can lead to symptoms ranging from skin or eye irritation to cancer or stillbirths[143]. Side effects can also be caused by the three most-imported active ingredients in Kenya: Glyphosate is a probable carcinogen; Imidacloprid is highly toxic to bees; and Mancozeb is a suspected endocrine disruptor and a likely carcinogen.

Comparison with other studies

Another 2015 study in Kenya showed that nearly half of all people directly exposed to pesticides on the job suffered symptoms of general malaise, headache, and respiratory problems[15]. A separate University of Bern study (2018) showed that not only the people directly working with pesticides suffer perceived harms, but also those living nearby due to wind distribution[16]. The majority of interviewees in a different Swiss r4d study claimed to be very concerned about pesticide effects on health[17]. 37% of local farmworkers (N=361) indicated suffering ill health from use of agrochemicals, and 43% of the farmworkers had no training in agrochemical safety[9].

RECOMMENDATIONS FOR POLICY IN KENYA

Our observations and recommendations are in line with the 2017 report of the Special Rapporteur of the Right to Food to the Human Rights Council (Elver 2017), which calls for a policy framework to reduce pesticides and abolish HHPs:

- Governments should take HHPs off the markets, starting with WHO Class I substances and organophosphates (e.g. Beta-cyfluthrin, Methiocarb and Chlorpyriphos). Neonicotinoids such as Imidacloprid and Thiamethoxam should be phased out based on their risks to pollinators.
- National statistics institutes with no ties to the pesticide industry should monitor pesticide imports and use, and should provide official, reliable information. Monitoring should include regular farm inspections to ensure that not only food consumers, but also food producers are given the best-possible protection against pesticide harms.
- Farmers should pursue pesticide-free agroecological farming practices that prevent pesticide exposure, enhance biodiversity, help to improve air, soil, and water quality, and mitigate climate change. Farmers should be encouraged and supported in transitioning to agroecological practices like crop rotation, soil fertility management, push–pull technology, and crop selection adapted to local conditions. Measures can include trainings, direct payments, and market development for agroecological products, e.g. via public procurement.

HIGHLY HAZARDOUS PESTICIDES FOUND ON FARMS

A total of 32 HHPs were found on farms near Mt. Kenya, 28 HHPs on agro-industrial farms. Smallholder farmers used Beta-cyfluthrin, Chlorothalonil, Chlorpyriphos, Cypermethrin, Glyphosate, Mancozeb, and Pirimicarb[8]. The full overview of HHPs found is listed in Ottiger, Fabian; Kiteme, Boniface; Jacobi, Johanna (2019). Highly Hazardous Pesticides (HHPs) in Agro-industrial and Smallholder Farming Systems in Kenya (CDE Policy Brief). Bern, Switzerland: Centre for Development and Environment, University of Bern

Full table see **link**

International guidelines: Governments' commitment

As a party to the International Covenant on Economic, Social and Cultural Rights (ICESCR), Kenya recognizes fundamental human rights in its constitution of 2010. The constitution emphasizes the duty of the state to guarantee people's rights to food, water, and health (Art. 43, 46, 53) and to life in a healthy, protected, and balanced environment (Art. 42). Kenya has ratified the Rotterdam Convention on the Handling of Chemicals, and the Stockholm Convention on hazardous waste.

Ways forward

A 2017 UN Report disputes the claim that pesticides are necessary to feed the world, and assesses their impacts on human rights. The report recommends (a) eliminating global double standards of pesticide regulation; (b) implementing policies to reduce pesticide use worldwide and phase-out HHPs; (c) promoting agroecology as an alternative; (d) placing liability on pesticide producers[18].

The UN Declaration on the Rights of Peasants – approved in 2018 by 121 countries, including Kenya and Switzerland – upholds "the right not to use or to be exposed to hazardous substances or toxic chemicals, including agrochemicals or agricultural or industrial pollutants."

While the Kenyan Government has banned the import of substances listed by the Rotterdam Convention, it should go a step further and ensure that Kenyans are able to produce enough sustainable food without risking harms to their health and the environment related to use of HHPs, in accordance with the precautionary principle and the long-term goal of pesticide-free farming.

Experiences from all over the world show that replacing pesticides with agroecological designs enhances ecosystem functions, including pest regulation, and thereby eliminates the need for agrochemicals[19].

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THE AUTHORS

Johanna Jacobi, PhD
Senior research scientist, University of Bern, Centre for Development and Environment (CDE), Switzerland
johanna.jacobi@cde.unibe.ch

Boniface Kiteme, PhD
Director, Centre for Training and Integrated Research in Arid and Semi-arid Land Development (CETRAD), Kenya
b.kiteme@africaonline.co.ke

Fabian Ottiger, MSc
Researcher, University of Bern, Institute of Geography, and foraus-Forum Aussenpolitik, Switzerland
fabian.ottiger@foraus.ch

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