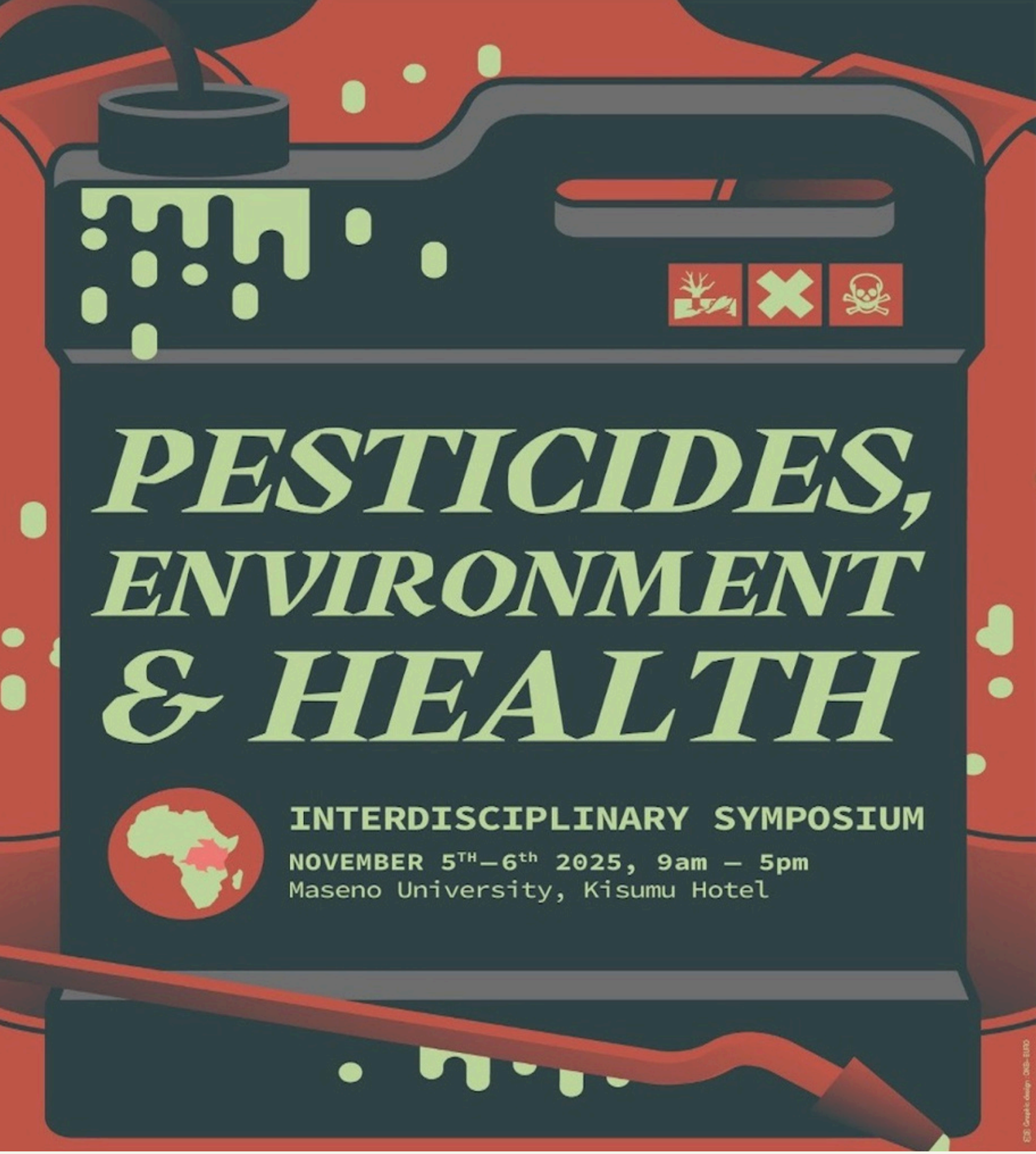

Proceedings Report

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GREENPEACE AFRICA
HEINRICH BÖLL STIFTUNG NAIROBI
Norway
ROUTE TO FOOD

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FOREWORD

The environmental and health implications of pesticide use are increasingly becoming a subject of concern across East Africa. Farmers rely on pesticides to protect crops and sustain agricultural production, yet growing evidence shows that many of these chemicals pose significant risks to ecosystems, food systems, and human well-being. Addressing these challenges requires open dialogue, strong research partnerships, and sustained collaboration between universities, policymakers, civil society organisations, and farming communities.

It is in this spirit that Maseno University and the University of Oslo, through the NORHED-funded Anthropology of Environment and Medicine in East Africa (AnthEM) project, convened the Pesticides, Environment, and Health Interdisciplinary Symposium in Kisumu, Kenya, on 5 - 6 November 2025. The symposium brought together researchers, students, policymakers, civil society organisations, and practitioners from across Kenya, Uganda, and Tanzania to exchange research findings, reflect on policy developments, and discuss pathways toward safer and more sustainable agricultural practices.

A central objective of the symposium was to create space for interdisciplinary dialogue on pesticide use and its broader implications for environmental health, public health, and food systems in the region. The presentations and discussions highlighted important emerging evidence on pesticide contamination in water, soils, and ecosystems, while also reflecting on the social, economic, and institutional factors that shape pesticide use across East Africa.

The symposium also took place at a moment when pesticide governance is receiving increasing attention in public and policy discussions. Recent regulatory developments in Kenya, alongside growing regional research and advocacy efforts, indicate a shift toward more critical reflection on the role of highly hazardous pesticides and the need to support safer alternatives.

At the same time, participants emphasised that addressing pesticide-related risks requires more than regulatory action. Strengthening research collaboration, supporting farmer-led innovation, expanding access to sustainable alternatives, and improving knowledge exchange across the region are all essential components of a long-term transition toward more resilient agricultural systems.

These proceedings report the key insights and discussions from the symposium. It reflects the contributions of researchers, practitioners, and organisations working across disciplines and countries to better understand the environmental and health implications of pesticide use and to explore viable pathways toward safer agricultural practices.

Maseno University and the University of Oslo hope that the knowledge shared during the symposium, and documented in these proceedings, will contribute to continued research, policy dialogue, and regional collaboration on pesticide governance and sustainable food systems in East Africa.

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PREFACE

The question of how societies produce food while safeguarding human health and the environment has become increasingly important across East Africa. Over the past decade, growing scientific evidence, citizen concern, and policy debate have drawn attention to the widespread use of highly hazardous pesticides and their implications for farmers, consumers, ecosystems, and food systems more broadly.

The Pesticides, Environment, and Health Interdisciplinary Symposium, held in Kisumu, Kenya on 5-6 November 2025, created an important platform for dialogue on these issues. Convened by Maseno University and the University of Oslo through the NORHED-funded Anthropology of Environment and Medicine in East Africa (AnthEM) project, the symposium brought together researchers, policymakers, civil society organisations, farmers, and students from across Kenya, Uganda, and Tanzania to reflect on the environmental and health impacts of pesticide use and to explore pathways toward safer and more sustainable alternatives.

For the Heinrich Böll Foundation (hbf) - Nairobi, supporting this dialogue is closely connected to our work to advance the realisation of the right to food and to promote more sustainable and just food systems. Through the Route to Food Initiative, the Foundation has worked with partners across Kenya and the region to strengthen public awareness, policy engagement, and research on pesticide governance, food safety, and agroecological alternatives.

The discussions during the symposium demonstrated that the conversation on pesticides in East Africa is evolving. What was once largely confined to scientific or technical debates is increasingly becoming part of wider public and policy discourse. Recent policy developments ni Kenya and growing regional collaboration reflect the importance of continued engagement among researchers, governments, civil society organisations, and farming communities.

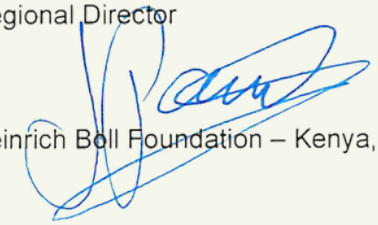
At the same time, participants recognised that reducing reliance on highly hazardous pesticides requires more than regulatory reform. Farmers need accessible and practical alternatives, research institutions must continue generating evidence on environmental and health impacts, and policy frameworks must support the transition toward safer agricultural practices.

These proceedings bring together the key presentations, reflections, and discussions shared during the symposium. They document the emerging evidence on pesticide contamination in soils, water, and ecosystems, highlight policy developments and governance challenges, and present experiences from farmers and practitioners working to develop viable alternatives.

By documenting these discussions, the proceedings aim to contribute to ongoing regional conversations on pesticide governance and sustainable agriculture. It is our hope that the insights captured here will support researchers, policymakers, civil society organisations, and farming communities in shaping food systems that protect both human health and the environment.

The hbf Nairobi is pleased to have supported this symposium and the preparation of these proceedings, and we look forward to continuing collaboration with partners across East Africa to advance safer and more sustainable agricultural futures.

Joachim Paul
Regional Director



Heinrich Böll Foundation – Kenya, Uganda and Tanzania

ACKNOWLEDGEMENTS

The organisers wish to express their sincere appreciation to the institutions and organisations whose collaboration and support made the Pesticides, Environment, and Health Interdisciplinary Symposium possible, which took place in Kisumu, 5th and 6th November 2025.

We are grateful to Maseno University for hosting the symposium and for providing a platform that enabled meaningful dialogue among researchers, policymakers, civil society organisations, and practitioners working on issues related to pesticides, environmental health, and sustainable agriculture in East Africa.

We also acknowledge the collaboration with the University of Oslo through the NORHED-funded Anthropology of Environment and Medicine in East Africa (AnthEM) project, which continues to strengthen interdisciplinary research and academic partnerships across the region. The project has played an important role in supporting research, learning, and regional exchange on the connections between environment, health, and society.

Special appreciation is extended to the partner organisations whose contributions enriched the symposium and helped bring together diverse perspectives. These include the Heinrich Böell Foundation-Nairobi, through the Route to Food Initiative (RTFI); Greenpeace Africa; PELUM Kenya; and Ecotrac Consulting, whose work continues to advance research, policy dialogue, and public engagement on pesticide governance and sustainable food systems.

The organisers also acknowledge the editorial, coordination, and technical support provided by the Route to Food Initiative (RTFI) in compiling and preparing these symposium proceedings, ensuring that the discussions, research findings, and reflections shared during the meeting are documented and made accessible to a wider audience.

Finally, we extend our appreciation to the universities, research institutions, civil society organisations, and regional networks from Kenya, Uganda, and Tanzania whose participation enriched the discussions and strengthened the exchange of knowledge and perspectives during the symposium.

The conversations reflected in these proceedings are part of a broader regional effort to better understand the environmental and health implications of pesticide use and to support the transition toward safer and more sustainable agricultural systems in East Africa.

Ms. Elizabeth Atieno Opolo
Food Campaign Lead
Greenpeace Africa

Ms. Rosina Mbenya
Country Coordinator
PELUM Kenya

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EXECUTIVE SUMMARY

Citizens, researchers, and policymakers in East Africa are increasingly concerned about the widespread use of toxic synthetic pesticides in agriculture and disease control. Smallholder farmers in Kenya, Tanzania, and Uganda often apply these chemicals, yet they have inadequate protective equipment and limited training on how to handle pesticide waste. Studies reveal the presence of Highly Hazardous Pesticides (HHPs), including substances banned in their countries of origin, highlighting systemic regulatory gaps, weak enforcement, and double standards in global pesticide governance.

Beyond immediate human health risks, HHPs pose significant environmental threats—harming biodiversity, contaminating water, and degrading soils, while reinforcing cycles of pesticide dependence. Research and advocacy have, however, focused mainly on health impacts, though ecological consequences—directly linked to human exposure—remain under-recognised in policy and public discourse.

Scientists and policymakers in the three East African nations of Kenya, Tanzania, and Uganda are pursuing a shared objective of reducing the health and environmental risks posed by HHPs, with evidence and advocacy increasingly informing policy action. In June 2025, Kenya withdrew 77 harmful pesticides and restricted a further 202. Tanzania has established regulatory frameworks and announced the phase-out of 44 HHPs, but implementation remains limited, with regulatory priorities still centred on plant health and limited support for safer alternatives.

In Uganda, enforcement gaps persist, compounded by ongoing transboundary trade in banned pesticides. These common challenges demonstrate that national measures alone are insufficient. Effective HHP bans and stricter regulations require region-wide policy harmonisation across East Africa, coordinated enforcement, and shared investment in viable alternatives, supported by sustained collaboration among governments, scientific institutions, and other stakeholders.

It is with this understanding that Maseno University and the University of Oslo, in collaboration with the Heinrich Böll Foundation, Route to Food Initiative, Greenpeace Africa, PELUM Kenya, and Ecotrac Consulting, convened the *Pesticides, Environment and Public Health in East Africa – Towards Sustainable Alternatives* symposium. The gathering aimed to mobilise regional expertise to accelerate East Africa's transition from HHPs, promote safer alternatives, and align research, regulation, and policy to protect both human health and ecological integrity without compromising agricultural productivity.

The symposium was structured into six thematic sections: environmental impacts of pesticides; stocktaking of achievements, gaps, and next steps in Kenya; regional pesticide politics, including common challenges, differences, and cooperation; current pesticide use and viable alternatives; insights from ongoing field research; and alternative farming practices and products.

LIST OF ACRONYMS AND ABBREVIATIONS

AFSA	Alliance for Food Sovereignty in Africa
AnthEM	Anthropology of Environment and Medicine in East Africa
BIOGI	Bio Gardening Innovations
CIDP	County Integrated Development Plan
CREPP	Community Rehabilitation and Environmental Protection Programme
FAO	Food and Agriculture Organization
HBF	Heinrich Böll Foundation
HHP	Highly Hazardous Pesticides
IFSAA	Intersectoral Forum on Agrobiodiversity and Agroecology
KEMRI	Kenya Medical Research Institute
KEPHIS	Kenya Plant Health Inspectorate Service
KeNAWRUA	Kenya National Association of Water Resources Users' Associations
MRL	Maximum Residue Limit
NIMR	National Institute of Medical Research
NMG	Nation Media Group
NORHED	Norwegian program for capacity development in High Education and Research for Development
OACK	Organic Agriculture Centre of Kenya
PCPB	Pest Control Products Board
PELUM	Participatory Ecological Land Use Management
RODI	Resource Oriented Development Initiative
TPHPA	Tanzania Plant Health and Pesticide Authority

INTRODUCTION

The *Pesticides, Environment, and Health Interdisciplinary Symposium* was held in Kisumu, Kenya, on 5th and 6th November 2025. Convened by Maseno University in collaboration with the University of Oslo under the NORHED-funded AnthEM project, the symposium brought together representatives from civil society organisations, environmental and social scientists, and regional policymakers from Kenya, Uganda, and Tanzania.

The meeting provided a platform to share and promote knowledge on the environmental harms associated with pesticide use, examine achievements and gaps in pesticide politics and policy, and identify priorities for future research, networking, and advocacy - key steps toward a regional phase-out of Highly Hazardous Pesticides (HHPs).

The hybrid workshop featured interactive panels, plenary discussions, and research presentations. This proceedings report summarises the key presentations, insights, and discussions that emerged from the symposium.

PURPOSE OF THE PESTICIDES, ENVIRONMENT, AND HEALTH INTERDISCIPLINARY SYMPOSIUM

As outlined in the concept note, the symposium provided a platform to:

- Share knowledge on the environmental and health impacts of pesticide use.
- Highlight policy progress and gaps in East African pesticide regulation.
- Explore sustainable alternatives through research, farmer practices, and policy innovation.
- Strengthen regional collaboration and advocacy networks for phasing out HHPs.

BACKGROUND AND RATIONALE OF THE SYMPOSIUM

Across East Africa, citizens, researchers, and policymakers are concerned about the widespread use of toxic synthetic pesticides in agriculture and disease control. Smallholder farmers in Kenya, Tanzania, and Uganda often apply pesticides, yet they have inadequate protective equipment and limited training on how to handle and dispose of pesticide waste.

Studies reveal the presence of Highly Hazardous Pesticides (HHPs), including substances banned in their countries of origin due to acute and chronic toxicity. This raises a critical question: why do pesticides prohibited elsewhere continue to enter East African markets? Are current regulatory frameworks too weak, are enforcement mechanisms insufficient, or do systemic gaps in compliance persist? These issues underscore troubling concerns around double standards in global pesticide governance, yet the risks associated with HHPs are significant and far-reaching.

SILENT BUT SIGNIFICANT CONCERN: THE UNDER-RECOGNISED ENVIRONMENTAL BURDEN OF PESTICIDES

Beyond immediate human health impacts, HHPs use poses great environmental risks. It is damaging biodiversity by killing pollinators and natural pest predators, disrupting ecological balance, and weakening crop resilience.

Runoff from agricultural fields contaminates water sources, threatening drinking water quality and aquatic life. Pesticide residues also degrade soil health by harming beneficial microorganisms essential for soil fertility and nutrient cycling.

These interconnected impacts lock farmers into cycles of dependency on more potent chemicals, undermining sustainable food production, eroding nutrition security, and weakening the region's long-term environmental resilience.

Evidence from East Africa and beyond shows that research and advocacy on pesticides have placed greater emphasis on human health impacts than on broader ecological consequences, even though these dimensions are deeply interconnected.

While environmental effects are well documented in the scientific literature, they tend to receive far less public and policy attention than visible health impacts. The science is strong, but the visibility and policy traction remain comparatively weak.

Recent studies presented at this symposium illustrate the scale of environmental contamination. Research from Lake Naivasha's feeder rivers and the Lake Victoria Basin revealed high ecological risk, particularly for crustaceans, with diazinon emerging as the major driver of toxicity.

The Africa Soil Project has demonstrated widespread contamination of agricultural soils with non-EU-approved substances such as chlorpyrifos, metolachlor, atrazine-hydroxy-2, and imidacloprid. In Uganda, another study found that 94.2% of sampled water sources contained at least one detectable pesticide residue.

These findings confirm that environmental contamination is real, measurable, and escalating. Despite this evidence base, it remains scarce, fragmented, and unevenly disseminated. Environmental effects are often diffuse, accumulate gradually, and lack the immediacy that drives public mobilisation. They do not produce the dramatic visuals associated with poisoning cases, even though they silently degrade soils, pollute water bodies, and erode biodiversity.

This slow-burning destruction compromises the very ecological systems on which agriculture, nutrition, and livelihoods depend. East Africa cannot afford to continue weakening its soils, water resources, and biodiversity with chemicals that promise short-term gains but deliver enduring harm.

In reality, the human health and environmental impacts of pesticides are inseparable. The same chemicals and practices that contaminate air, water, soil, and biota also determine how people are exposed, what they eat, and the quality of their drinking water. Pesticides applied to crops move through shared exposure pathways: they infiltrate soils, leach into groundwater, wash into rivers and lakes, and accumulate on or within food.

Environmental contamination thus becomes a direct conduit to human exposure. Moreover, environmental degradation frequently translates into indirect health risks. The loss of fish, aquatic invertebrates, and pollinators threatens food security and nutrition, with cascading effects on human well-being. As natural enemies decline and pest resurgence occurs, farmers often respond by applying more pesticides to sustain crop yields, and this not only deepens ecological damage but also compounds the human exposure levels.

Persistent chemicals used in the region thus bio-accumulate, linking long-term environmental contamination to adverse health outcomes. Pesticide dependence in East Africa is therefore both an environmental and public health challenge.

FROM QUIET CONCERN TO VISIBLE ACTION: POLICY MOMENTUM AND THE PATH TOWARD PHASING OUT HHPS

Stronger policies, effective enforcement, and support for safer alternatives areamong the most powerful tools for reducing pesticide-related health risks, protecting ecosystems, and advancing more just and sustainable food systems.

Across East Africa, growing scientific evidence, consumer outcry, and sustained civil society advocacy are beginning to translate into visible policy action. In June 2025, Kenya took a landmark step when the Cabinet Secretary for Agriculture announced the withdrawal of 77 harmful pesticide products from the market and the restriction of a further 202 to controlled use, with an additional 151 products under review.

This progress aligns with Tanzania's announced phase-out of 44 highly hazardous pesticides and ongoing regulatory reforms, as well as Uganda's efforts to strengthen pesticide controls despite persistent enforcement and cross-border trade challenges.

Taken together, these developments signal a region-wide shift from concern to action, while underscoring the need for harmonised East African policies, coordinated enforcement, and shared investment in safer alternatives to ensure that national gains translate into durable regional impact.

HHPS PHASE-OUT: REFORM IS JUST STEP ONE

Yet policy reform is only the starting point. Announcing a ban is one thing; ensuring it is enforced - and that harmful products are truly removed from circulation - is another. Joachim Paul, Director of Heinrich Böll Foundation, Nairobi aptly notes: "While these actions signal progress, we must also be honest: this is, and can only be, the beginning."

Substantial challenges persist along the value chain as actors attempt to transition from HHPs to safer alternatives. These include entrenched dependence on conventional chemical agriculture reinforced through training systems; limited transition support for alternatives; fragmented mandates among regulatory institutions; continued allowances for certain HHP uses, such as in greenhouses and termite control; and the absence of county-level regulations to operationalise national policy decisions.

Strengthening enforcement, enhancing regional policy coherence, improving monitoring embracing agroecology as a pathway forward, multi-stakeholder collaboration in learning and advocacy, and expanding transition support, especially through accessible and affordable alternatives, will be essential to scaling up and sustaining the shift away from HHPs. All of these are key in translating evidence into policy and policy into practice.

Based on this context, Maseno University and the University of Oslo, in collaboration with the Heinrich Böll Foundation and the Route to Food Initiative, Greenpeace Africa, PELUM Kenya, and Ecotrac Consulting, convened the *Pesticides, Environment and Public Health in East Africa - Towards Sustainable Alternatives* symposium.

The aim was to bring together regional expertise to examine how East Africa can transition from dependence on Highly Hazardous Pesticides and move toward safer, sustainable alternatives. The symposium was grounded in the recognition that such a transition requires research, regulation, and policy agendas to evolve alongside scientific evidence; ensuring that agricultural productivity is not pursued at the expense of human health or ecological integrity.

WELCOME REMARKS

MESSAGE FROM THE DEPUTY VICE-CHANCELLOR, MASENO UNIVERSITY

PROF. ERICK NYAMBEDHA

It is my great pleasure to welcome all participants to Maseno University for this important regional symposium on pesticides, environmental health, and sustainable alternatives.

Your presence, representing diverse universities, institutions, and countries, underscores the urgency and relevance of this gathering. Kenya is an agricultural country, and agriculture forms the backbone of our economy. Discussions on pesticides are therefore central to national priorities, particularly food safety, environmental health, and human wellbeing.

Speaking from an anthropological perspective, it is evident that perceptions about pesticides are held across society, by both the highly educated and those with no formal schooling. Growing up along River Nzoia, I often heard conversations about a once-plentiful and highly valued fish species. When Pan Paper Mills was established upstream in 1973, villagers recounted that the fish disappeared due to chemicals released into the river. Years later, after the factory closed, rumours circulated that the fish had returned.

These local narratives, whether scientifically verified or not, highlight how communities intuitively observe and interpret environmental changes. People notice the impacts of chemicals on aquatic life long before formal studies document them. For anthropologists and researchers alike, such perceptions are important; they reflect lived experiences and shape how communities understand environmental harm. This symposium is therefore timely, as it provides a platform for dialogue, debate, and perhaps further research on how pesticide use affects human health, environmental health, agricultural productivity, and food safety.

I extend my gratitude to our collaborators from the University of Oslo and other partners for convening this workshop. As we deliberate over the next two days, let us seize the opportunity to strengthen linkages between research, policy, and practice. Workshops always generate valuable insights that fail to translate into meaningful action.

Our discussions in this workshop should produce tangible outputs - policy briefs, research agendas, and evidence-based recommendations - that can strengthen regulation, inform sustainable practices, and improve the wellbeing of farmers and the community.

While Kenya recently banned several hazardous pesticides, research remains limited on how these policies are received at the grassroots level. Overreliance on pesticides to boost crop yields continues without adequate understanding of their health and environmental consequences. This symposium is an opportunity to dissect these risks, develop solutions that enhance research, expand knowledge on pesticide impacts, and inform academic programmes in universities, ensuring that future professionals graduate with an evidence-based understanding of current issues.

In closing, I sincerely thank all participants for taking the time to join this symposium. I look forward to discussions over the next two days that can translate into practical solutions that inform policy, guide research, and strengthen sustainable practices.

MESSAGE FROM THE PROJECT LEAD, AnthEM

PROF. RUTH PRINCE, UNIVERSITY OF OSLO

I would like to extend a warm welcome on behalf of the organisers, the University of Oslo and Maseno University, and particularly thank Professor Nyambedha, Kevin, and the organising committee for their critical role in making this eventpossible. Our gratitude also goes to Kisumu Hotel for hosting us so warmly.

As Professor Nyambedha mentioned, this symposium builds on the collaboration between the University of Oslo and Maseno University through the NORHED-funded AnthEM project, which also involves the University of Nairobi, KEMRI, the University of Dar es Salaam, the National Institute of Medical Research in Tanzania, and Makerere University in Uganda.

We are delighted to welcome students and colleagues from these institutions and are confident that this interdisciplinary symposium will inspire you to contribute, in your future careers, to the critical dialogue between research, policy, and advocacy.

The AnthEM project aims to strengthen research and teaching capacity in anthropology on environment and health issues across East Africa, nurturing a new generation of students who will actively engage in both scientific research and policy-making within governments and civil society.

Beyond AnthEM, this symposium reflects significant teamwork. The Route to Food Initiative and Heinrich Böll Foundation, with leaders including Dr. Harun Warui and Christine Gatwiri, have been instrumental in bringing pesticide issues into public and policy discourse.

Greenpeace Africa, represented by Elizabeth Atieno, Ferdinand Omondi, and Lynn Cherotich, as well as Ecotrac Consulting and PELUM Kenya, particularly Jeff Kahuho and Rosina Mbenya, have also played key roles in organising the programme, speakers, and participants.

This event builds on a 2024 symposium in Dar es Salaam, organised by Dr. Vera Ngowi, a toxicologist from the University of Muhimbili and former director of the Pesticide Research Institute. Dr. Ngowi has been a strong advocate for the regulation and control of highly hazardous pesticides in Tanzania, and her leadership has shaped regional discussions on pesticide safety.

PRELIMINARY SESSION

SETTING THE SCENE

The opening session set the tone for the conference, underscoring the urgent need to reduce reliance on Highly Hazardous Pesticides (HHPs) while acknowledging progress and persistent challenges. The key message was clear: phasing out HHPs is underway through policy and practice, but these efforts mark only the beginning.

The session drew on a robust evidence base, including the 2022 Pesticide Atlas and scientific studies that show that nearly 44% of pesticides in Kenya contain ingredients banned in the EU. While human health impacts are increasingly documented, environmental harms—soil degradation, water contamination, and pollinator loss - remain largely invisible, threatening long-term food security.

Civil society advocacy, particularly by the Route to Food Initiative, has driven national pesticide withdrawals, culminating in major reforms in Kenya: eight HHPs were reviewed in April 2025, followed by an Executive Directive removing 77 products and restricting 202 more in June.

The session also highlighted regional challenges: pesticides traverse borders via shared food, water, and soil systems, creating involuntary exposure. Structural limitations - including fragmented institutional mandates, weak coordination, high costs for farmers, limited access to safer alternatives, and inadequate enforcement - continue to impede effective regulation. Policy gaps remain, with some banned substances still allowed in greenhouses or for termite control due to limited monitoring and research on ecological residues.

Recommendations include supporting farmers in transitioning to safer, agroecological practices and strengthening regional, multi-stakeholder collaboration to translate scientific evidence into actionable policies and practices.

SESSION ONE: ENVIRONMENTAL IMPACTS OF PESTICIDES

In this session, research scientists presented studies highlighting the environmental impacts of pesticides and proposed evidence-based recommendations for mitigation.

- **Water Contamination:** Research highlights widespread pesticide contamination of water resources, sediments, and aquatic organisms, primarily from fungicides and banned HHPs. Crustaceans and other aquatic species face acute toxicity, while pesticide-driven shifts in snail populations may increase transmission of schistosomiasis. HHP residues were also detected in commonly consumed vegetables, and while pre-treatment can reduce residues, significant amounts persist, posing human health risks. Recommendations emphasise investment in water infrastructure, public awareness, and coordinated engagement among researchers, policymakers, civil society, and communities.

- **Soil Contamination:** Studies show extensive pesticide residues in African soils, particularly from insecticides, with many sites containing multiple compounds, including non-EU-approved substances. This contamination poses high risks to soil organisms and ecosystem functions, highlighting critical knowledge gaps and the transboundary nature of pesticide movement. Findings underscore the urgent need for strengthened regulatory and management interventions and the promotion of sustainable agricultural practices to protect soil health.
- **Effects on Pollinators:** Broad-spectrum insecticide use is reducing populations of beneficial insects, particularly bees, compromising pollination services and destabilising ecosystems. Recommendations include promoting Integrated Pest Management (IPM) approaches that prioritise non-chemical controls, farmer training on pollinator-friendly practices, and policy incentives to support the adoption of sustainable agricultural methods.

Overall, the session emphasised that addressing environmental pesticide impacts requires multi-stakeholder collaboration, integrated monitoring, and the alignment of research, policy, and practice to protect both ecosystems and human health.

SESSION TWO: STOCKTAKING IN KENYA – ACHIEVEMENTS AND NEXT STEPS

This session examined Kenya's progress in pesticide management and sustainable agriculture, while identifying priorities for the future. Achievements highlighted included the advocacy work of the Route to Food Initiative in driving policy reforms, the expansion of knowledge on safer alternatives through civil society engagement, the reinforcement of citizens' rights such as the right to food, and the successful implementation of agroecology at scale.

Despite these successes, important challenges persist. Policy restrictions on pesticide use remain unclear in practice, illegal transboundary trade continues across East Africa, and political and economic interests still favour chemical pesticide use.

Looking ahead, strategic litigation offers a means for affected communities to hold regulators and companies accountable for harms caused by HHPs. Agroecology provides a viable pathway to gradually phase out HHPs, while supporting county governments to operationalize national pesticide policies, which will be critical to converting commitments into tangible outcomes.

SESSION THREE: REGIONAL ROUNDTABLE PESTICIDE POLITICS - COMMON CHALLENGES, DIFFERENCES AND COOPERATION

This session examined the politics of pesticides across East Africa, highlighting common challenges, differences, and avenues for regional cooperation.

Common Challenges

- **Policy–practice gaps:** Tanzania has established regulatory frameworks and

announced the phase-out of 44 HHPs, yet implementation remains limited. Policies prioritise plant health over HHP reduction, with minimal support for alternatives. Similarly, in Kenya and Uganda, regulatory enforcement is inconsistent, and transboundary trade of banned pesticides persists.

- **Systemic drivers of pesticide misuse:** Farmers operate within flawed systems characterised by inadequate training, weak enforcement, corporate influence, and limited access to sustainable practices. Responsibility for misuse, however, rests primarily with corporations rather than the farmers themselves.

- **Science-policy disconnect:** Evidence on pesticide harms often fails to inform regulation due to short-term productivity priorities, political interference, and weak enforcement.

DIFFERENCES

Kenya has advanced legal and policy measures, including the 2022 Petition E048 and HHP withdrawals; Tanzania focuses on plant health management over HHP phase-out; Uganda struggles to translate research into regulations.

REGIONAL COOPERATION AND OPPORTUNITIES

- Science-informed advocacy: Strategic litigation, exemplified by Kenya's 2022 Petition E048, demonstrates the power of science to hold manufacturers accountable and drive policy change.

- Coordinated regional legal action can harmonise pesticide regulations, curb transboundary trade of banned chemicals, and empower citizens' rights to safe and adequate food.

- Media and public awareness: Investigative journalism and storytelling play a key role in exposing risks, promoting safer alternatives, and encouraging farmer and consumer engagement.
- Addressing the nexus of pesticide use, nutrition security, and public health requires cross-sector collaboration among scientists, policymakers, civil society, and communities for agroecology and sustainable alternatives.

SESSION FOUR: ROUNDTABLE: CURRENT PESTICIDE USE AND VIABLE ALTERNATIVES

Presenters agreed that many farmers still depend on pesticides, including chemicals such as Roundup, which harm rivers, wildlife, and ecosystems. Large-scale farms, including Sony Sugar, were cited for contributing to water contamination through the continued use of industrial agrochemicals.

The session also highlighted the severe health impacts of HHPs through the testimony of Isaac Njuguna, who suffered irreversible injuries - loss of skin, nails, and permanent

vision impairment - following exposure in corporate employment. His experience underscored that pesticide exposure can be life-threatening and impose high medical and legal costs.

Farmers emphasised that effective and affordable alternatives exist. Locally accessible options such as tithonia, ash brew, bokashi, and compost were shown to reduce pest pressure. Knowledge-sharing in farmer forums, on-farm demonstrations, and farmer-led research were identified as key drivers accelerating the adoption of agroecological alternatives.

Farmer-led research emerged as a particularly effective pathway for change, enabling farmers to test, adapt, and rapidly adopt biopesticides and other alternatives. Overall, the session reaffirmed that nature-based farming, with soil health at its core, offers the most sustainable path to resilient agriculture.

SESSION FIVE: INSIGHTS FROM ONGOING FIELD RESEARCH

Master's and PhD students from the NORHED-funded AnthEM programme presented findings from their ongoing research, revealing a heavy dependence on agrochemicals to boost yields - particularly for 'fast-crops' such as tomatoes.

The studies showed that pesticide use is driven not only by pest pressure but also by an interplay of factors, including seed type, soil health, climate conditions, land tenure, and market demand. Farmers were aware of the health risks associated with pesticide use yet continued to rely on these chemicals to protect their investments and secure marketable produce.

The research also highlighted persistent challenges in scaling organic practices, as well as unsafe handling and disposal of pesticide-related waste, which pose serious health and environmental risks.

Overall, the findings underscore the urgent need to promote safer agroecological alternatives to reduce dependence on highly hazardous pesticides. They further point to the importance of holistic strategies that address the interconnected drivers of pesticide use, policies and support systems grounded in local realities, and strengthened local capacity to enable farmers to benefit from organic production.

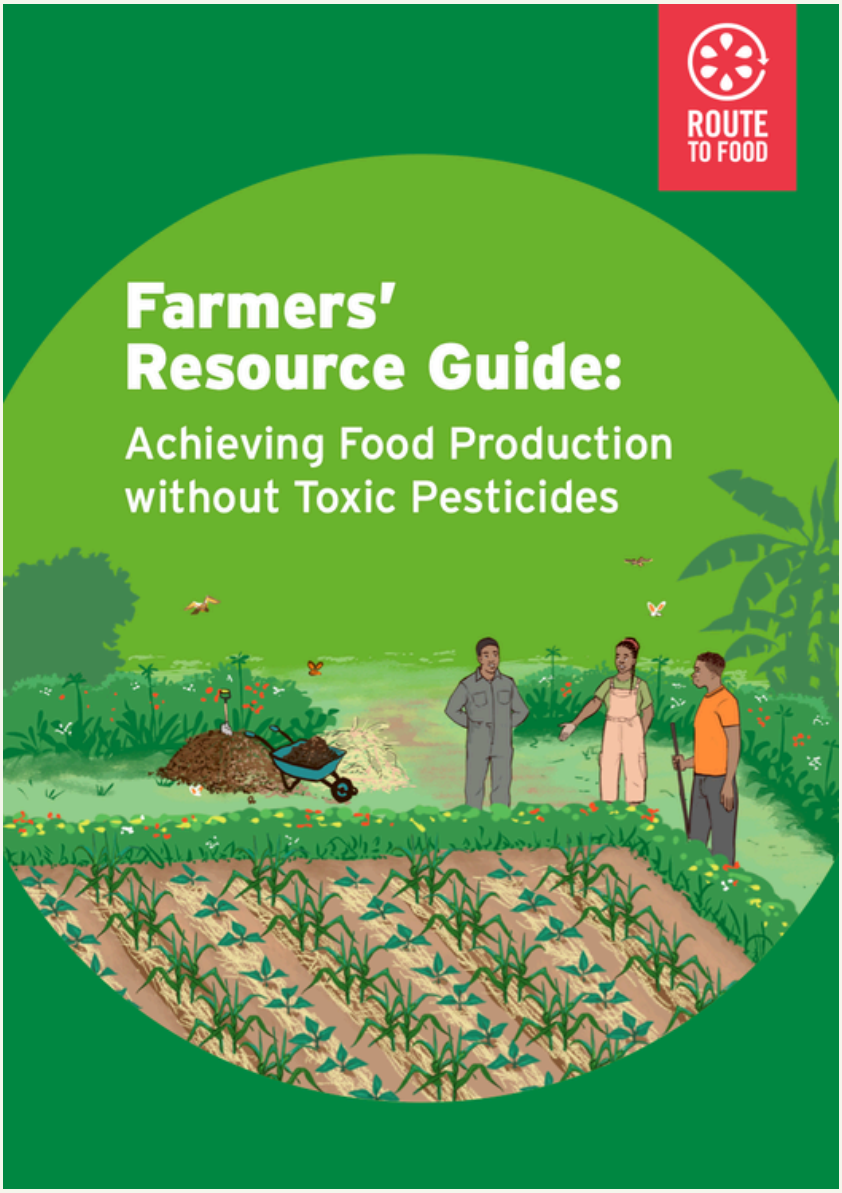
SESSION SIX: ALTERNATIVE FARMING PRACTICES AND PRODUCTS

This session highlighted farmer-led agroecology as a practical and effective pathway to reduce reliance on chemical pesticides while improving soil health, environmental integrity, and human well-being. Small-scale farmers are successfully producing low-cost bio-inputs - such as ash brews, plant teas, and fermented extracts - using locally available materials and indigenous seeds, demonstrating that viable alternatives to HHPs already exist. Healthy food production was consistently linked to soil health rather than chemical inputs.

Barriers to scaling these alternatives include restrictive and costly certification processes that disadvantage organic products relative to chemical inputs, despite strong field evidence of effectiveness.

Some progress has been made by registering biopesticides as biofoliars, showing that agroecological solutions can scale within existing regulatory frameworks, albeit with significant effort. An additional challenge is the lack of qualified personnel in agrovet shops, exposing farmers to unsafe advice and hazardous practices.

Enablers of transition include farmer-led learning, peer exchange, and accessible knowledge tools - such as the *Farmer's Resource Guide* - which empower farmers to make informed decisions and accelerate the shift toward safer, sustainable food production systems.



SETTING THE SCENE

CHAIR:
PROFESSOR WENZEL GEISSLER,
UNIVERSITY OF OSLO

SUMMARY

This session outlined the conference's rationale and set the tone for subsequent discussions. It featured speeches and presentations on why this conversation on pesticides matters, an overview of pesticide policies in Kenya, an introduction to the Greenpeace Project, and a presentation on the environmental impacts of pesticides. Key takeaways from the session are outlined below.

Speakers

- *Joachim Paul,* Director, Heinrich Böll Foundation, Nairobi
  Title: Why it all Matters
- *Dr. Harun Warui,* Project Lead, Route to Food Initiative, Heinrich Böll Foundation, Nairobi
  Title: Introduction to Pesticide Policies in Kenya
- *Elizabeth Atieno,* Food Campaigner, Greenpeace Africa
  Title: Introduction to the Greenpeace Project
- *Dr. Silke Bollmohr,* Managing Director, Ecotrac Consulting
  Title: Environmental Impacts of Pesticides: Recent Evidence and Policy Agenda

KEY TAKEAWAYS:

- **Overall message:** Phasing out HHPs is underway through policy and practice- but only the beginning.

- **Evidence Base:** The *2022 Pesticide Atlas* revealed that nearly 44% of pesticides used in Kenya contain ingredients banned in the EU, and three-quarters of products

include at least one highly hazardous pesticide (HHP)[1]. Scientific reports including the *Scientific Report on Pesticides in the Kenyan Market,*[2] further identified 30 HHPs and their active ingredients, underscoring the tangible harm these chemicals pose to farmers, consumers, soils, water, and biodiversity.

- **Environmental impacts remain largely invisible:** While human health harms are increasingly documented, environmental damage is chronically under-researched and under-reported. Soil degradation, polluted water sources, declining pollinators, and other slow-onset ecological harms rarely make news but profoundly threaten long-term food production and ecosystem stability.under-reported. Soil degradation, polluted water sources, declining pollinators, and other slow-onset ecological harms rarely make news but profoundly threaten long-term food production and ecosystem stability.

- **Recent policy momentum:** Advocacy by civil society - especially the Route to Food Initiative - has driven national pesticide withdrawals, culminating in major 2025 reforms: review of 8 HHPs in April 2025[3] and an Executive directive withdrawing 77 products and restricting 202 more in June[4].

- **Unintended cross-border contamination:** Pesticides are moving through shared food, water, and soil systems across the region - an involuntary form of "sharing" that underscores the urgency of regional dialogue and coordinated action.

- **Structural challenges:** Fragmented institutional mandates and weak coordination hinder effective regulation. Farmers face high costs and limited access to safer alternatives, while enforcement and monitoring remain inadequate.

- **Policy gaps despite progress:** Recent reforms in Kenya are promising, but loopholes remain—some pesticides banned for food crops are still allowed in greenhouses or termite control due to insufficient environmental monitoring and limited research on ecological residues and pathways.

- **Recommendations:** Meaningful support for farmers, including awareness, affordability & accessibility- transitioning to safer alternatives and agroecological practices. Regional, multi-sector, and multi-stakeholder collaboration to drive the translation of evidence into policy and practice.

[1] https://ke.boell.org/sites/default/files/2022-11/pesticideatlas2022_kenya.pdf
[2] https://routetofood.org/wp-content/uploads/2021/09/Scientific-Report-on-Pesticides-in-the-Kenyan-Market-Report_Final-1.pdf

[3] https://www.pcpb.go.ke/wp-content/uploads/2025/04/Circular-Registration-review-of-products-containing-a.i-Propoxur.pdf
[4] https://www.the-star.co.ke/news/2025-06-23-77-pesticides-banned-in-kenya-as-202-others-restricted

WHY IT ALL MATTERS

JOACHIM PAUL, DIRECTOR,
HEINRICH BÖLL FOUNDATION, NAIROBI

The Heinrich Böll Foundation, through the Route to Food Initiative, strives to advance the realisation of the right to food in Kenya by promoting public awareness, citizen engagement, and policy advocacy on food systems. This symposium marks a defining moment for Kenya and East Africa - a shift from quiet, often academic concern about pesticides to visible public and policy engagement.

Across the region, citizens, scientists, and policymakers are asking how we can grow food that nourishes people, protects biodiversity, and sustains life. The 2022 Pesticide Atlas, mainly authored by Dr. Silke Bollmohr, provided critical evidence: nearly 44% of pesticides used in Kenya contain ingredients banned in the EU[5], and three-quarters of products include at least one highly hazardous pesticide. These figures are not abstract - they illustrate how soils, water, and biodiversity are paying the price for chemical dependence.

The Heinrich Böll Foundation has continued to publish studies, scientific reports, and advocacy briefs promoting a shift toward safer, fairer, and more sustainable food systems, which has driven regulatory reforms. Encouraging policy steps have been taken by the Kenyan government: in September 2024, the Pest Control Products Board reviewed HHPs, followed by the Ministry of Agriculture's announcement in April 2025 reviewing eight HHP active ingredients. In June 2025, the Cabinet Secretary confirmed the withdrawal of 77 pesticide products, restricted the use of 202 others, and initiated a broader regulatory review. These actions reflect years of joint effort by scientists, civil society, and farmer advocates calling for accountability and transparency.

We also focus on solutions: when HHPs are withdrawn, farmers need effective alternatives. Are these alternatives truly accessible and implemented, not just withdrawn on paper? In response, the Farmers' Resource Guide on Alternatives to Highly Hazardous Pesticides[6] was published, providing practical support available on electronic platforms. Our engagement remains clear: Kenya must phase out HHPs while ensuring farmers are not left behind, equipping them with knowledge, biological alternatives, and market support to farm safely and profitably. Economic considerations are central to this approach.

[5]https://ke.boell.org/sites/default/files/2022-11/pesticideatlas2022_kenya.pdf
[6]https://docs.google.com/viewerng/viewer?url=https://routetofood.org/wp-content/uploads/2024/12/Farmers-Resource-Guide-Achieving-Food-Production-without-Toxic-Pesticides.pdf&hl=en

These steps signal progress, but this is only the beginning. Implementation, enforcement, farmer training, and access to viable alternatives remain urgent gaps. This symposium is therefore critical - we are not only here to discuss what has been banned but to explore viable replacements. At the Heinrich Böll Foundation, we believe agroecology provides the pathway forward, linking food safety with environmental health, farmers' livelihoods, and social justice.

Sustainable transformation requires collaboration among farmers, researchers, policymakers, civil society, and regional frameworks, translating evidence into policy through shared learning, consistent advocacy, and political will. As we open this symposium, I invite reflection on three questions: What kind of food systems do we want for East Africa? How can science, policy, and advocacy reinforce one another? And how can we work across borders, recognising that pesticide trade and impacts extend beyond national boundaries?

INTRODUCTION TO PESTICIDE POLICIES IN KENYA

DR. HARUN WARUI, PROJECT LEAD OF THE ROUTE TO FOOD INITIATIVE AT, HEINRICH BÖLL FOUNDATION, NAIROBI

Dr. Harun Warui, Project Lead of the Route to Food Initiative at the Heinrich Böll Foundation, Nairobi Office, underscored that although nearly half of the pesticides used in Kenya are banned in the EU, highly hazardous pesticides (HHPs) remain widely used. Most products contain at least one active ingredient classified as highly hazardous, placing farmers, consumers, and ecosystems at considerable risk. These impacts extend to public health, biodiversity, and economic stability, and raise concerns about food sovereignty and the realisation of the right to food.

Kenya's pesticide governance framework - covering importation, regulation, and use - is anchored in CAP 346 (1982) and administered by the Pest Control Products Board (PCPB), supported by institutions such as the National Environment Management Authority (NEMA), the Kenya Plant Health Inspectorate Service (KEPHIS), and 47 county governments. Notably, Kenya operates a devolved governance system in which agriculture is constitutionally designated as a county-level function.

ACHIEVEMENTS

Policy momentum has built gradually since the enactment of the Pesticides Control

Products Act in 1982 and the establishment of the PCPB. Until 2021, most pesticide withdrawals were driven by international conventions such as the Rotterdam Convention. Civil society advocacy - particularly through the Route to Food Initiative - shifted this trajectory, increasing intentional national withdrawals through research publications, media awareness campaigns, and capacity-building efforts.

Several milestones mark this progress. Parliamentary Petitions No. 70 of 2019 and 006 of 2020, championed by civil society and leaders such as Hon. Gladys Boss Shollei, brought national attention to dangerous pesticides on the market. The Pest Control Bill, drafted in 2020 and later approved by the Cabinet, laid the groundwork for regulatory reform.

In April 2025, the Ministry of Agriculture set out to review eight HHP active ingredients. This was followed in June 2025 by an Executive Directive withdrawing 77 pesticide products, restricting 202 others, and initiating a broader regulatory review; significant steps that reflect growing acceptance of evidence-based advocacy.

EMERGING CHALLENGES

Institutional mandates are fragmented, resulting in weak coordination and limited enforcement, which in turn undermines effective monitoring of pesticide residues. Transparency in PCPB's processes, particularly registration, withdrawals, and safety oversight, is insufficient. While capacity-building efforts exist, including those led by AAK CropLife and civil society actors such as the Route to Food Initiative, as exemplified by their Farmers' Guide to Alternatives, they are still inadequate.

The transition to alternatives is further challenged by high costs and limited access to bio-input alternatives. Integration across agriculture, health, and environmental policies is weak. Dr. Warui further noted that regional cooperation remains a critical gap, and the symposium will deliberate on advancing an integrated policy approach to harmonise East African frameworks.

WAY FORWARD

Dr. Warui emphasised that banning HHPs is only the beginning. Sustainable transformation requires strengthened enforcement, monitoring, and transparency within regulatory bodies; meaningful support for farmers transitioning to safer alternatives and agroecological practices; expanded agroecology research and integration of food, health, and environmental policies; and empowerment of counties and communities to implement emerging frameworks.

County-level leadership - from Murang'a, West Pokot, Makueni, Nakuru, and Kajiado - demonstrates promising progress. Finally, regional collaboration remains essential to harmonise pesticide and agroecology policies in East Africa.

By addressing these challenges and building on recent reforms, Kenya can move toward safer and more sustainable food systems that protect both human health and the environment

INTRODUCTION TO THE GREENPEACE PROJECT

ELIZABETH ATIENO, FOOD CAMPAIGNER, GREENPEACE AFRICA

Africans are known for their generosity, but today we find ourselves unintentionally "sharing" pesticides through our food, water, and soil, across the region. This is not the kind of generosity our grandparents envisioned, and it underscores why platforms like this symposium are essential.

Greenpeace Africa is part of a global movement working in 55 countries, including Kenya, Cameroon, the DRC, and Senegal. Our core belief is simple: people deserve clean and safe food, a healthy environment, and a liveable planet. Yet Africa's food systems are increasingly dependent on fossil fuel-based agriculture: synthetic fertilisers, petrochemical pesticides, intensive machinery, and wasteful supply chains.
This model, sold as modernisation, is deepening food insecurity and placing economic and structural pressure on farmers while reinforcing dependence on imported inputs and external corporations.

Our Food or Poison campaign addresses the critical challenge of shaping the continent's food future. Greenpeace recognises and appreciates the institutions, researchers, farmers, journalists, and CSOs, particularly the Heinrich Böll Foundation, whose evidence, advocacy, and persistence have driven the growing momentum and policy shifts on highly hazardous pesticides (HHPs).

Greenpeace Africa's role is not to duplicate these efforts, but to strengthen them and ensure that the communities most affected lead in the search for solutions. While human health impacts, such as cancer clusters and reproductive disorders, are documented, environmental impacts remain under-researched and under-prioritised. Soil degradation, contamination of rivers and groundwater, collapsing pollinator populations, and other slow-onset ecological harms rarely make headlines, yet they undermine the continent's ability to produce food sustainably. Groundwater contamination or the gradual loss of pollinators, for example, does not spark instant public attention, yet these slow-onset harms carry profound consequences for ecosystems, food production, and human wellbeing.

Despite recent progress in Kenya, gaps remain. Some pesticides whose application on food crops was banned are still permitted in greenhouses or for termite control, largely because environmental monitoring and research are insufficient. Issues such as bioaccumulation in living organisms, leaching into soil and groundwater, long-distance transport via wind and water, and trophic transfer up the food chain demand urgent attention.

To address these gaps, Greenpeace Africa has partnered with experts like Dr. Silke Bollmohr from Ecotrac Consulting, who has contributed significantly to HHP research with the Heinrich Böll Foundation. Together, we are advancing work focused on environmental impacts.

Food is life, and protecting life requires ensuring that our food systems do not destroy the ecosystems that sustain us. That is why we are here: researchers, farmers, policymakers, students, and advocates. Your presence strengthens the collective effort to challenge misinformation, build evidence, and chart a safer way forward. Our grandparents taught us to share seeds, knowledge, and abundance, not pesticides in our water and soil. This symposium is an opportunity to restore that vision.

ENVIRONMENTAL IMPACTS OF PESTICIDES-RECENT EVIDENCE AND POLICY AGENDA

DR. SILKE BOLLMOHR, MANAGING DIRECTOR, ECOTRAC CONSULTING

OVERVIEW

Greenpeace Africa, in collaboration with Ecotrac Consulting, is conducting research on the environmental impacts of highly hazardous pesticides (HHPs) across Kenya, Ghana, and South Africa. It is complemented by parallel studies on water, soil, and pollinators. The work challenges the dominant narrative that HHPs are essential for food security, demonstrating instead that ecological health - soil life, thriving pollinators, biodiversity, and clean water - is the true foundation of sustainable production.

WHY IS A HEALTHY ENVIRONMENT IMPORTANT?

Pollinators play an indispensable role in African food systems. 87% percent of the world's leading crops depend on animal pollination, contributing 35% of global production. In Kenya, studies - including research from Kakamega Forest - show yield increases of up to 25% when pollinators are abundant. Some crops, such as squash and pumpkin, can achieve up to 99% higher yields with bee pollination.

Pollination also enhances nutritional quality. Research on legumes demonstrates

significant gains in protein and nitrogen content where pollinators are present. Beneficial insects further reduce pest pressure and support productivity. A meta-analysis from Sub-Saharan Africa shows that abundant beneficial insects can reduce pest levels by 63%, cut crop damage by half, and boost yields by 60%.

Soil health is equally vital. Fertility alone is insufficient, and the broader concept of soil health must be considered. Healthy soils require active biological life, such as earthworms, bacteria, fungi, and organisms that drive nutrient cycling and make nutrients bioavailable to crops. Without this biological activity, nutrients present in the soil may remain inaccessible, compromising both yield and food quality.

Highly hazardous pesticides (HHPs) undermine all these ecological foundations. They harm soil organisms, pollinators, aquatic life, and broader biodiversity. Their mobility in the environment means contamination is widespread: drift carries pesticides to nearby water bodies; runoff transports them into rivers and wetlands; leaching affects groundwater; and residues persist in soil. This evidence underscores the need for policy and practice shifts that safeguard environmental systems essential for resilient, sustainable food production.

Notably, this research focused on case studies across three regions: Kenya (East Africa), Ghana (West Africa), and South Africa (Southern Africa). We reviewed all pesticides registered as of 2025, excluding those already banned in Kenya, such as chlorpyrifos.

KEY FINDINGS

I. *High prevalence of HHPs across the continent*

- HHPs comprise almost 50% of all registered pesticides in Kenya, Ghana, and South Africa,
  with Ghana leading in banned substances.
- Analysis of volume and usage data in Kenya, conducted with the Heinrich Böll Foundation, reveals that around 75% of pesticides in use are HHPs -- substantially higher than registration figures suggest.

II. *Toxicity profiles of registered pesticides.*
Although toxicity levels appeared similar in Kenya and Ghana, they seemed lower in South Africa, reflecting incomplete registration data, as full access requires CropLife membership despite South Africa having far more registered products.

Using an HHP list compiled earlier this year by Unpoisoned, we found that HHPs are significantly more toxic than other registered pesticides. Risk assessments for bees, fish, and earthworms indicate that a large share of pesticides in all three countries pose hazards to multiple forms of environmental life.

ARE PESTICIDES PRESENT IN WATER, SOIL, AND POLLINATOR PRODUCTS, AND DO THEY HAVE MEASURABLE EFFECTS?

This case study further reviewed African research on whether pesticides are present in water, soil, and pollinator products, and whether they have measurable effects. Unlike

Europe, which uses highly hazardous pesticides but has extensive monitoring - showing only 17% of topsoil samples are pesticide-free - Africa lacks comparable data, so the scale of contamination is largely unknown.

- **Soil Pollution**

  Soil studies show multiple residues ("pesticide cocktails") in most samples, with only 17% pesticide-free, paralleling European findings.

  One notable exception on African data is Dr. Vera Silva's work on "African Soils and Pesticide
  Residues: Implications for Soil Health and Regulation" under the Soils for Africa project, an African Union initiative on soil fertility. Her analysis across several African countries found similar results to Europe: only 17% of soils were pesticide-free, most contained multiple residues (pesticide cocktails), and the most common active ingredients were highly hazardous pesticides such as chlorpyrifos, bifenthrin, and imidacloprid, which are all banned in the EU except glyphosate.

- **Water Pollution**

  All sampled water bodies contained pesticide residues, with an indirect effect on human health.

  Across our literature review, nearly all detected pesticide residues were HHPs, highlighting a clear problem: HHPs are widespread in both soil and water. European studies show a similar pattern - most water samples contain dozens of pesticides, with fewer than 6% having fewer than ten.

  In Africa, numerous studies, particularly from Kenya, reveal comparable contamination. Faith Kandi's study, "How Clean is Our Water? A Case Study of Pesticide Pollution in the Lake Victoria South Basin, Kenya", documents persistent pesticide contamination around Kisumu, Naivasha, and Narok, with chlorpyrifos repeatedly detected. Kenya's recent ban on this insecticide is therefore timely, given its widespread prevalence.

  We also found indirect effects of pesticides on human health. For example, the effectiveness of malaria spraying is reduced because mosquitoes have developed resistance. A 2025 study showed that mosquito larvae exposed to pesticides in rivers became resistant to insecticides when they became adults. Similarly, pesticide contamination in rivers has been linked to increased bilharzia in Kenya: the parasite-hosting snails tolerate pesticides, while competing species die off, allowing the snails to dominate ecosystems and spread the disease.

- **Pollinators**

  Scientists have detected various neonicotinoids in pollinator products, such as pollen and nectar, around Murang'a, Kiambu, and Nairobi. However, the status of insect biodiversity across Africa remains largely unknown. In Europe, insect abundance has declined by 75%, highlighting the scale of the problem. These gaps represent key research opportunities for scientists in Africa.

STUDY CONCLUSIONS AND POLICY IMPLICATIONS

HHPs are widely used across Africa, with about 50% of registered pesticides in Kenya, Ghana, South Africa, and Nigeria classified as HHPs. These pesticides are present in soil, water, and

pollinator products, yet their effects on biodiversity remain largely unknown due to limited monitoring.

Notably, all detected HHPs are banned in Europe, yet 2024 data from Public Eye and Unearthed Greenpeace show that European pesticide exports to Africa are rising, with Morocco and South Africa as the largest recipients and Germany as the leading exporter. Exports have doubled, highlighting ongoing double standards and underscoring the urgent need for a phase-out or ban of these highly toxic pesticides.

Understanding and mapping pesticide use is essential. The Pesticide Atlas we developed with the Heinrich Böll Foundation visualises toxic pesticide use by crop and location, helping scientists to identify hotspots. Entomologists can focus pollinator impact studies in the darkest pink areas, where pesticide use is highest. Governments can apply the same approach to prioritise monitoring, phase-outs, or bans, and target hotspots to make interventions more efficient and effective instead of attempting nationwide coverage.

Pesticide regulation is fragmented across ministries and sectors. A One Health approach of linking agriculture, environment, labour, and health can strengthen coordination, align national policies with international frameworks, and improve enforcement. Current gaps allow banned or phased-out HHPs, such as chlorpyrifos and imidacloprid, to remain in use. Finally, promoting and supporting safer alternatives is essential to reduce reliance on highly hazardous chemicals and protect human health, biodiversity, and ecosystems.

SESSION ONE: ENVIRONMENTAL IMPACTS OF PESTICIDES

Session Chair: *Ferdinand Omondi, Greenpeace Africa*

Session Overview: The environmental impacts of pesticide use remain chronically under-researched and under-reported, often confined to academic discussions and largely invisible to the public. This session sought to address this gap through five presentations on the environmental effects of HHPs in East Africa. The session highlighted three overarching themes: water contamination, soil contamination, and impacts on pollinators. Key takeaways from the session are outlined below.

Speakers

- *Enock Kiminta,* Chief Executive Officer, KeNAWRUA
  Title: Citizen-Led Pesticides Screening in Lake Naivasha Feeder Rivers

- *Faith Kandi,* Water Quality Researcher, Moi University
  Title: How Clean Is Our Water? A Case Study of Pesticide Pollution in the Lake Victoria South Basin, Kenya

- *Bernard Bwambale,* Head of Programs, Global Consumer Centre
  Title: Pesticides in the Environment in Uganda

- *Dr. Mary Gikungu,* Director, National Museum, Nairobi
  Title: Pesticides and Pollinators

- *Dr. Vera Silva,* Researcher, Wageningen University, Soil4Africa
  Title: African Soils and Pesticide Residues: Implications for Soil Health

KEY TAKEAWAYS:

- Studies reveal widespread, persistent pesticide contamination across water, sediments, and aquatic organisms, with banned compounds posing significant ecological and public health risks.
- Ecological risks are significant: crustaceans are highly sensitive, and pesticide-driven shifts in snail populations pose the risk of increased schistosomiasis transmission, hence the link between environmental and health impacts.
- Pesticide contamination in African soils is widespread, with most soils containing multiple residues, including persistent insecticides such as chlorpyrifos, AMPA, dinoterb, and DDE, and nearly a quarter of sites pose high risks to soil organisms and ecosystem functions, underscoring critical knowledge gaps and the urgent need for regulatory and management interventions.
- Early detection, systematic monitoring, and integrated risk assessments are critical to safeguard soil health, guide sustainable agricultural practices, and inform evidence-based policy interventions.

- Extensive use of synthetic pesticides - organophosphates, and pyrethroids - threatens bees, butterflies, and other pollinators, undermining critical pollination services for crops and wild plants.

The session recommends urgent action through stronger regulatory enforcement, adoption of safer agricultural practices, including Integrated Pest Management, coordinated multi-stakeholder engagement, and systematic environmental monitoring to safeguard human health and ecosystems.

The results indicate that while pre-treatment can lower pesticide residues, significant amounts of highly hazardous chemicals persist in commonly consumed vegetables such as tomatoes, posing potential health risks.

Citizen-Led Pesticide Screening in Lake Naivasha Feeder Rivers, Kenya

Author: Kenya National Water Resources Users Association (KENAWRUA) with support of the European Union Research Commission

Presenter: *Enock Kiminta, KeNAWRUA*

Background

Data from the Route to Food Initiative shows that pesticide use in Kenya rose from 6,400 tonnes in 2015 to nearly 15,600 tonnes in 2019[7]. This surge reflects growing food demand and the intensification of agriculture, all of which drive higher pesticide use and, in turn, greater contamination of water bodies, with risks to aquatic ecosystems and public health. In Lake Naivasha, earlier studies focused mainly on legacy pesticides from floriculture, overlooking the pesticides used by small-scale farmers and their contribution to contamination.

Methods

Local citizens/community scientists from KENAWRUA were trained and co-designed the sampling strategy and carried out field sample collection. A total of 100 mL water samples were collected from seven sites (four rivers and three lake locations), including two major feeder rivers originating from the Aberdares, a key catchment area for Lake Naivasha. Pesticide extraction was conducted using stir-bar sorptive extraction (SBSE). After field collection, samples were stirred, transferred into EU Research Commission–approved containers, and shipped to a laboratory in the Netherlands for chemical analysis.

[7] https://routetofood.org/wp-content/uploads/2024/11/Pesticides-in-Kenya-Why-our-health-environment-and-food-security-are-at-stake.pdf

Results and Discussion

- *Pesticide Detection*

This study detected a wide range of pesticides, including fungicides, insecticides, herbicides, and related compounds across all sampled sites. Thirteen pesticides occurred in 100% of samples. These included fungicides such as boscalid and tebuconazole, and insecticides such as chlorpyrifos, diazinon, and metolachlor. Notably, many of the

pesticides recently reported in a viral Egerton University study on potatoes also appeared in our samples. Pesticides were detected in all major inflows to Lake Naivasha, including Gilgil and Malewa rivers, as well as the seasonal Maraigushu and Karati rivers. The wastewater treatment plant outfall showed the highest diversity, with 43 different pesticides.

- *Concentrations*

The Karati River recorded the highest total concentrations (2,369.1 ng/L), reflecting intensive agriculture and floriculture along its catchment. Lake Naivasha had the second-highest concentrations, influenced by both wastewater discharge and flower farms. Banned pesticides such as dieldrin and hexachlorobenzene were also detected, underscoring their persistence years after prohibition.

- *Ecological Impact*

Ecotoxicological assessment indicated elevated toxicity units at several sites, with Daphnia magna showing clear signs of stress and reduced survivability in Lake Naivasha, River Gilgil, and other sampled rivers. Continued detection of chlorpyrifos, which was scheduled for phase-out in 2024, also signals gaps in compliance.

In total, 56 pesticides were identified, with boscalid, bromopropylate, and metolachlor being the most prevalent. These findings highlight significant contamination risks to aquatic ecosystems and the urgent need for regulatory and management interventions.

HOW CLEAN IS OUR WATER? A CASE STUDY OF PESTICIDE POLLUTION IN THE LAKE VICTORIA SOUTH BASIN, KENYA

PRESENTER: FAITH KANDIE, MOI UNIVERSITY

INTRODUCTION

Chemicals of emerging concern, including pesticides, enter the environment through multiple pathways such as direct application on farms, improper disposal, leaching from dumpsites, manure application, and runoff into surface and groundwater.
These contaminants are of concern because of their toxicity to humans and ecological receptors. Global assessments on the occurrence of pesticides show significant data gaps in Africa, with Kenya, South Africa, and Ethiopia among the few countries conducting monitoring.

To address this knowledge gap, this study investigated pesticide contamination and associated risks in the Lake Victoria South Basin, a region of approximately 3.5 million people dominated by agricultural, residential, and urban land use. The main objective was to monitor these contaminants in the different compartments - mainly water, biota, sediments—and also to look at the risk to aquatic organisms and human beings.

METHODS

- *Study Area*

Sampling was conducted at 48 sites across seven counties, covering diverse agricultural zones including rice irrigation fields, tea estates, sugarcane plantations, and maize-growing regions. Water sites included rivers, reservoirs, drainage canals, and lakes.

- *Sampling and Analysis*

Sampling was conducted in September–October, coinciding with Kenya's short rainy season. Water samples were collected and analysed without pre-treatment using liquid chromatography coupled to high-resolution mass spectrometry. Snail tissues

were processed using the QuEChERS extraction method, while sediment samples underwent pressurised liquid extraction followed by flash-chromatography cleanup.

- *Target Compounds*
  The study targeted 428 chemicals, including 152 pesticides and their transformation products. An additional 133 pesticides registered in Kenya were included through suspect screening to capture compounds not typically monitored in Europe.

RESULTS

- A total of 26 parent compounds and five transformation products of pesticides and biocides were detected in water samples. The most frequently occurring chemicals were simazine (88%), dodemorph (65%), and bendiocarb (60%), with the highest concentration (1.5 µg/L) observed for hexazinone.
- In biota, 19 pesticides were detected in snails, with atrazine showing the highest concentration (375 ng/g wet weight) and a detection frequency of 95%, followed by DEET (93%). Sediment analysis identified 55 pesticides, with concentrations up to 110 ng/g organic carbon, including additional compounds such as thiacloprid, which were not detected in water but appeared in biota and sediments.
- Contamination patterns varied by land use. Rice and sugarcane areas showed substantially higher pesticide burdens than maize and tea-growing regions. For tea-growing areas, the lower contamination levels likely reflect a mismatch between spraying schedules and sampling times, or the presence of wider buffer zones, which offer greater separation between treated fields and adjacent waterways compared with rice and sugarcane systems.
- Ecological risk assessment identified crustaceans as the most sensitive species, with diazinon frequently exceeding acute risk thresholds. Other high-risk compounds included bendiocarb, carbendazim, and pirimiphos-methyl.
- Seasonal monitoring in a follow-up year-round study across five rivers revealed 80 pesticides and biocides, with 22 compounds detected year-round, irrespective of wet or dry season. Higher detection counts during the May wet season corresponded to increased herbicide application, notably 2,4-D, 2-hydroxyatrazine, and metribuzin.
- Human health risk indicators aligned with ecological findings. Host snails for Schistosomiasis demonstrated high tolerance to pesticides such as imidacloprid and diazinon, even at solubility limits, while competitor snail species experienced complete mortality. This pesticide-driven shift in community composition favours the proliferation of disease-hosting snails, thereby increasing transmission risk.

CONCLUSIONS AND RECOMMENDATIONS

Our waters are heavily contaminated with pesticides, posing significant ecological and public health risks; crustaceans and other aquatic species face acute toxicity, while shifts in snail populations linked to pesticide exposure may increase schistosomiasis transmission. These water bodies are not distant or abstract, as they are relied upon by local communities for drinking, cooking, and bathing, meaning human exposure is immediate and daily.

Addressing this challenge requires urgent action: investment in water infrastructure, raising awareness among local populations, and coordinated engagement across multiple stakeholders. The issue extends beyond science and needs collaboration between researchers, policymakers, civil society, and communities. Expanding research and systematic environmental surveillance, including through scientific societies such as the Society of Environmental Toxicology and Chemistry (SETAC), is essential to inform policy and protect both human health and ecosystems.

PESTICIDES IN THE ENVIRONMENT IN UGANDA

Presenter: Bernard Bwambale, the Head of Programs at the Global Consumer Centre.

INTRODUCTION: NARRATIVES DRIVING PESTICIDE USE IN UGANDA

Pesticide use in Uganda is influenced by multiple narratives promoted by industry and other actors, presenting agrochemicals as solutions to agricultural challenges. These narratives often frame pesticides as tools to address climate change, rising pest and disease pressures, and the need to enhance food security and crop yields.
Despite widespread pesticide use, food insecurity remains prevalent across many households. The pervasive promotion of agrotoxins has led to their widespread availability, with pesticide retailers present even in remote trading centres and villages, highlighting the extensive penetration of these products into local agricultural systems.

BACKGROUND: PESTICIDE USE IN UGANDA

Uganda has robust legal and regulatory frameworks governing pesticides, including the 1995 Constitution, national environmental policies, and the Agrochemicals Control Act, alongside international conventions.

Despite this, pesticide use has escalated sharply over the past decade, more than doubling between 2010 and 2022, with import values rising from USD 32.57 million to USD 75.87 million (FAOSTAT, 2024).

Currently, Uganda registers 115 active ingredients and 669 pesticide brands. Alarmingly, 48% of active ingredients and 69% of brands are classified as highly hazardous, with over 65% of chemicals not approved in their countries of origin. Widespread exposure arises from unsafe handling and repurposing of pesticide containers in households,landfills, and water sources, creating significant health and environmental risks. Incidents elsewhere in Africa, such as the 2021 Durban pesticide warehouse fire, further illustrate the vulnerability of communities to pesticide contamination.

Ugandans are exposed to pesticides through multiple pathways. Women are often seen mixing and applying chemicals without protective equipment, directly increasing occupational exposure. Empty pesticide containers are frequently repurposed for storing

food, water, and household items, creating direct ingestion risks for families, including children.

These containers also accumulate in landfills, where they can leach hazardous chemicals into soil and water, extending environmental and public health exposure. With this background, this study examined whether there are pesticide residues in water resources, in food, and in the human body.

WHAT'S IN MY GLASS?

This study investigated the presence of pesticide residues in Uganda's water resources across four regions. A total of 86 community water sources - including boreholes, shadoofs, springs, dams, wells, lakes, streams, and taps - were sampled twice, at the start (April) and peak (June) of the cropping season.

KEY FINDINGS

- Pesticide detections increased threefold from April to June, indicating rising use during the agricultural season.
- Overall, 94.2% of sampled water sources contained at least one pesticide residue. Twelve pesticides were consistently detected across regions, with glyphosate, dichlorvos, and chlorpyrifos having the highest average concentration. Of the top five, three of them - aldicarb, dichlorvos, and chlorfenvinphos - are classified as highly hazardous products.
- Profenofos was detected in the largest number of sites (33/86), followed by atrazine (25/86) and chlorpyrifos (23/86).

This study demonstrates widespread contamination of water resources with pesticides, including highly hazardous compounds, highlighting potential risks to public health and the environment

WHAT'S ON MY PLATE?

This study examined whether highly hazardous pesticide residues are present in food, focusing on tomatoes. Samples were subjected to different pre-treatments - peeling, washing with hot water, and washing with cold water - to assess their effect on residue levels.

KEY FINDINGS

- Peeling was the most effective, reducing mancozeb residues by 69%, though 31% remained.
- Washing with hot water reduced residues by 38%, leaving 62% remaining.
- Washing with cold water reduced residues by 30%, leaving 70% remaining.

These results indicate that while pre-treatment can lower pesticide residues, significant amounts of highly hazardous chemicals persist in commonly consumed vegetables, posing potential health risks.

WHAT'S IN MY BODY?

The study assessed whether pesticide residues present in water and food accumulate in the human body.

KEY FINDINGS

- Urine samples collected from farmers in Wakiso District (2017–2019) confirmed the presence of mancozeb, glyphosate, and 2,4-D, indicating significant exposure.
- A related study among smallholder farmers found that exposure to mancozeb was associated with impaired visual memory, language difficulties, motor function deficits, and challenges with complex attention.
- Frequent pesticide application (at least twice in the previous week) correlated with poor sleep quality, with strong associations observed for recent exposure to mancozeb and glyphosate.

These findings demonstrate that highly hazardous pesticides not only persist in the environment and food but also bioaccumulate in humans, leading to measurable neurocognitive and physiological effects.

AFRICAN SOILS AND PESTICIDE RESIDUES: IMPLICATIONS FOR SOIL HEALTH

Presenter: Dr. Vera Silva, Researcher, Wageningen University, Soil4Africa.

BACKGROUND AND INTRODUCTION

This study reviewed existing literature on pesticide contamination in African soils, identifying 88 studies across 25 countries. However, most data came from only three countries, were limited in the number of compounds being analysed, and were largely collected before 2015. As in other regions of the world, information on soil pesticide pollution in Africa is scarce and fragmented.

The Soils for Africa project, conducted over the past five years and concluded earlier this year, addressed this gap by generating a comprehensive dataset on pesticide residues in African soils. A total of 272 topsoil samples were collected across multiple locations, providing first-time evidence of contamination in some locations and trend analysis in others. The aim was to establish the first comprehensive dataset that could provide

critical insights for shaping research priorities and informing pesticide policy recommendations in Africa.

METHODOLOGY

The study's approach was comprehensive: it combined application records, existing literature, and information on approved products in the countries being sampled. Using four analytical methods per sample, both active substances and their metabolites were detected, resulting in the analysis of 153 different pesticide residues.

RESULTS: PESTICIDE RESIDUES IN AFRICAN SOILS

- Prevalence: Only 56 of 272 soil samples (~21%) were pesticide-free, indicating widespread contamination. Notably, although153 different mixtures were analysed, this does not mean that additional pesticides would not appear if the analysis were expanded further. Fifty-three samples had a single pesticide residue; however, most soils contained multiple residues, typically 2 to 5 pesticides per sample, mirroring Europe; the maximum detected was 14 residues in a single soil sample. For comparison, Europe has up to 21 or 25 residues, suggesting potentially lower diversity of products or lower persistence here in Africa.

- Spatial patterns: Considerable diversity in the composition of mixtures was observed across countries and regions. Some areas showed consistently high residue counts and concentrations, likely reflecting differences in land-use intensity, farming practices, and regulatory enforcement.

- Breakdown by Country and Crop Type: Certain crops and regions exhibited higher contamination, indicated by elevated residue counts and concentrations. These patterns likely reflect differences in regulatory enforcement, agricultural practices, and climatic conditions. The results provide a basis for further investigation and informed discussions on pesticide management.

- **Pesticide types:** In contrast to water studies dominated by fungicides, soil samples were primarily contaminated with insecticides, reflecting their higher persistence in soil. Individual and combined concentrations reached up to 7mg/kg in some samples. were primarily contaminated with insecticides, reflecting their higher persistence in soil. Individual and combined concentrations reached up to 7mg/kg in some samples. It is difficult to make direct judgments based on these levels because thresholds for most pesticides are lacking. For reference, levels in Europe are usually higher, but it remains uncertain how this translates into soil health and soil services.

- **Most common residues:** Dinoterb, DDE (a DDT metabolite), chlorpyrifos, metolachlor, atrazine-hydroxy-2 (an atrazine metabolite), AMPA (a glyphosate metabolite), and imidacloprid were detected in at least 10% of soil samples. These seven most frequently detected residues are of concern due to their potential impacts on both environmental and human health.

- Country-level profiles: In Burkina Faso, 14 different pesticide residues were detected, most of which are not currently approved for use. While some may persist from past applications, the extent to which this fully explains their presence remains unclear, pointing to the need for further investigation, including the possibility of transboundary transport.

- Risk assessment: The toxicity of detected pesticide residues to soil organisms was assessed using established databases, in particular the standard risk-quotient approach. The analysis showed that 69 of the 272 samples posed a high risk to soil organisms and potentially to key soil ecosystem functions. For 16 samples, hazard data were entirely lacking, underscoring significant knowledge gaps regarding the toxicity of several compounds currently present in African soils.

- The study also sought to identify the key drivers of soil toxicity to determine which compounds lead to this high risk. Using two complementary tools - the risk quotient and a new pesticide prioritisation indicator - we assessed both the concentration and frequency of each residue, while also weighting compounds with limited hazard data. This combined analysis yielded 17 pesticide residues of highest interest for further investigation and consideration in policy and research for African soils.

- Country-specific assessments were also conducted, including compounds of high interest. For example, in Kenya, AMPA emerged as a top-interest compound due to its frequent occurrence, while DDT was highlighted for its high toxicity. Atrazine-hydroxy-2 ranked highly based on both frequency and toxicological relevance.

CONCLUSIONS

This work provides one of the most comprehensive assessments of pesticide contamination in African soils and aligns with global evidence of widespread soil pollution. Although pesticide levels in Africa are generally lower than those reported in Europe, this does not imply negligible risk. Early detection is critical for safeguarding soil health and guiding production systems before contamination becomes more difficult to manage.
A key finding is the high frequency of non-EU-approved substances in African agricultural soils. While transboundary movement of pesticides may partly explain this pattern, limited data on application records, local characteristics/practices, and regulatory enforcement constrain broader interpretation.

The study also identified a consistent set of seven commonly occurring residues, all of which present significant environmental or toxicological concerns. Risk-quotient analysis showed that 24% of sampled sites pose high risks to soil organisms and potentially to ecosystem functions. However, traditional risk metrics and prioritisation indicators may underestimate risks in cases of limited hazard data or low-level but frequent contamination, underscoring the need for more integrated assessment approaches.

Overall, these findings highlight the transboundary nature of pesticide contamination and reinforce the need for research agendas and policy actions that keep pace with scientific evidence and local agricultural realities. Strengthening sustainable agricultural practices remains urgent for protecting soil health across the continent.

Impact of Synthetic Pesticide Use on Natural Heritage

Presenter: Dr. Mary Gikungu, Director, National Museum, Nairobi

Introduction

Kenya's rich biodiversity and globally renowned wildlife face increasing pressure from the intensifying use of synthetic pesticides in agriculture. These chemicals threaten critical components of natural ecosystems, particularly pollinators such as bees, butterflies, and moths, which underpin both ecological functioning and agricultural productivity.

Pollinators support the reproduction of more than 75% of major food crops and nearly 90% of wild flowering plants, with global pollination services valued at an estimated USD 235–577 billion annually, highlighting their irreplaceable role. Although synthetic pesticides are applied to boost yields and manage pests, their persistence and broad-spectrum toxicity present significant risks to ecosystems, wildlife, and human health, ultimately endangering Kenya's natural heritage.

The Threat: Pathways of Contamination

Agricultural production in Kenya relies heavily on synthetic pesticides for pest and disease control. However, their extensive use poses significant risks to non-target organisms and ecosystems. Once applied, pesticides disperse through multiple environmental pathways—most notably surface runoff from agricultural fields during rainfall—which transports residues into rivers, lakes, and wetlands, leading to widespread contamination and impacting aquatic ecosystems.

Commonly used pesticide classes in Kenya, such as neonicotinoids, organophosphates, and pyrethroids, are particularly harmful, with well-documented toxicity to bees and other beneficial insects critical to ecosystem functioning. Weak enforcement of pesticide regulations and limited adoption of integrated pest management (IPM) practices further amplify contamination risks and environmental impacts.

Effects on Fauna

- **Birds:** Organochlorines and organophosphates are highly toxic, leading to mortality, reproductive failure, and behavioural disruption. Raptors are especially at risk due to biomagnification through contaminated prey.
- **Mammals:** Exposure through tainted vegetation, water, or prey results in poisoning, reduced fertility, and weakened immunity. Incidents of wildlife poisoning are increasingly reported near agricultural landscapes.

- **Insects and Pollinators:** Broad-spectrum insecticides inadvertently kill beneficial insects, particularly bees, undermining pollination services and destabilising ecosystems.
- **Aquatic Life:** Runoff carries pesticides into rivers and wetlands, causing fish, amphibian, and invertebrate deaths, reproductive impairments, and disruptions of aquatic food webs.

Effects on Ecosystems

- **Soil Health:** Persistent pesticides disrupt soil microbial communities critical for nutrient cycling and fertility, leading to long-term soil degradation and increased reliance on external inputs.
- **Water Quality:** Pesticide contamination of surface and groundwater undermines drinking water safety and harms aquatic ecosystems, contributing to eutrophication and algal blooms.
- **Habitat Degradation:** Extensive pesticide use reduces biodiversity by converting heterogeneous landscapes into simplified monocultures, weakening ecosystem resilience and species support.

Economic and Environmental Implications

The decline in biodiversity and environmental degradation resulting from pesticide contamination carries significant economic and ecological costs.

- **Economic Impacts:** Reduced pollination services lower crop yields and product quality, diminishing farmers' incomes and national agricultural revenue. For example, reduced pollination in coffee production can depress Kenya's export earnings. Wildlife losses further undermine tourism - one of the country's major sources of foreign exchange.
- **Environmental Impacts:** The decline of pollinators destabilizes ecosystems by disrupting plant reproduction, reducing biodiversity, and weakening the integrity of natural habitats. These disruptions can trigger cascading effects across food webs, compromising overall ecosystem function.

Solutions and Mitigation Strategies

Mitigating pesticide impacts on natural heritage and pollinators in Kenya requires coordinated, multi-level action:

- **Integrated Pest Management (IPM):** Promote IPM approaches that prioritize non-

chemical controls - such as biological agents, cultural practices, and resistant varieties - to reduce dependence on hazardous pesticides.

- **Regulatory Strengthening:** Enhance the capacity of the PCPB to enforce pesticide regulations, monitor distribution and use, and address non-compliance.
- **Farmer Training:** Scale up farmer education on safe pesticide handling, pollinator-friendly practices, and the benefits of IPM.
- **Research and Monitoring:** Support research on pollinator ecology, safer pesticide alternatives, and systematic monitoring of pollinator populations.
- **Pollinator-friendly Habitats:** Encourage the establishment and protection of floral resources and nesting sites within farming landscapes.
- **Policy Incentives:** Introduce incentives that support the adoption of sustainable agricultural practices and reduce pesticide use.

Success Story: The Makueni Mango Growers Initiative

In Makueni, mango farmers were facing a significant challenge: heavy reliance on pesticides in their orchards was reducing visits by pollinators, particularly bees, and ultimately lowering fruit yields. To address this, the Makueni Mango Growers Initiative introduced a comprehensive Integrated Pest Management (IPM) program. Farmers received training on sustainable practices, including the use of biological control agents for fruit flies and applying pesticides only when necessary.

The results were striking. Pesticide use dropped by 30%, while mango yields increased by 15%, driven largely by improved pollination. Additionally, local bee populations became noticeably more abundant, signalling a healthier orchard ecosystem. This success story highlights the tangible benefits of adopting sustainable agricultural practices, demonstrating that careful, targeted interventions can enhance both productivity and environmental health.

Call to Action

Safeguarding our natural heritage requires collective action. We must:

- Champion policies that promote sustainable agriculture and protect our natural heritage.
- Raise awareness by educating ourselves and others about the value of our ecosystems and the risks posed by pesticide overuse.
- Advocate for investment in research and extension services dedicated to conserving our natural heritage.
- Support farmers in adopting environmentally friendly practices that benefit both people and nature.

Together, these actions can ensure a healthier environment and a sustainable future for generations to come.

SESSION TWO: STOCKTAKING IN KENYA – ACHIEVEMENTS AND NEXT STEPS

Chair: Solomon Serrwanja, African Institute for Investigative Journalism and Christine Gatwiri, Route to Food Initiative

SESSION OVERVIEW

This session focused on taking stock of Kenya's achievements in pesticide management and sustainable agriculture, while charting the path forward.

Key highlights included the Route to Food Initiative, which has successfully advocated for policy reforms to regulate pesticides; the growth of knowledge on safer alternatives driven by civil society actors; the reinforcement of entitlements such as the right to food; and a notable success story of implementing agroecology at scale.

Despite these achievements, significant gaps remain. Questions remain on what restrictions of pesticides outlined in policy mean in practice, illegal transboundary pesticide trade continues across East Africa, and vested political and economic interests still favour chemical pesticide use.

Looking ahead, future directions emphasise the role of jurisprudence on harms caused by highly hazardous pesticides (HHPs), enabling affected communities to seek accountability from regulators and companies. Agroecology presents a pathway to gradually phase out HHPs, while supporting county governments in operationalising national pesticide policies will be essential to translate commitments into tangible outcomes.

Speakers

- **Speaker:** Dr. Harun Warui, Heinrich Böll Foundation, Nairobi
  Title: Highly Hazardous Pesticides in Kenya: Achievements, Lessons, and the Road Ahead
- **Speaker:** Hon. Agostinho Neto, Parliamentary Human Rights Association
  Title: Food Right Policy at National and County Levels
- **Speaker:** Fredrick Otieno, Centre for Environmental Justice and Development
  Title: HHP Use in Kajiado, Nakuru and Kirinyaga Counties
- **Speaker:** Millicent Kanario, Egerton University
  Title: Influence of On-farm Pesticide Practices and Processing Methods on Residue Levels in Potato Tubers (Solanum tuberosum L.) in Nyandarua County

- **Speaker:** Marie Ng'ang'a, Maridadi Farm
  Title: Agroecology: Beyond the Small-Scale Farms pesticide trade continues across East Africa, and vested political and economic interests still favour chemical pesticide use.

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HIGHLY HAZARDOUS PESTICIDES IN KENYA: ACHIEVEMENTS, LESSONS, AND THE ROAD AHEAD

ACHIEVEMENTS IN PHASING OUT HIGHLY HAZARDOUS PESTICIDES (HHPS) IN KENYA

Dr. Harun Warui of the Heinrich Böll Foundation highlighted the progress made through the Route to Food Initiative, a platform advocating for the right to food and building capacity on safe agricultural practices. Recognising the serious and irreversible harm caused by highly hazardous pesticides to both people and ecosystems, the Initiative mobilised action through the 2020 Parliamentary Petition Number 006, creating a demand for the withdrawal of HHPs.

Nationwide campaigns—through media, research, and civil society engagement - strengthened the momentum for reform, emphasising not only health impacts but also the critical environmental connections previously underappreciated. Since 2019, these coordinated efforts have yielded significant results: in 2023, eight active ingredients were withdrawn; in 2025, 77 products were banned, and 202 products were restricted, with 151 under review by the Pest Control Products Board (PCPB). These measures represent Kenya's first large-scale, nationwide withdrawal of HHPs, signalling a strong national and regional commitment to safe food production.

Policy and institutional gains have complemented these regulatory achievements. The draft Pest Control Products Bill (2022), recently approved by the Cabinet, modernises the 1982 PCPB Act and reinforces Cabinet-level recognition of food safety as a national priority. Parallel to this, knowledge in practical alternatives for farmers has grown substantially, supporting the alternative path away from conventional practices toward safe food production for consumers and the environment.

Civil society partners - including PELUM and Greenpeace - have developed guides on alternatives as exemplified by the Route to Food Initiative's Farmers' Guide. The guide has been translated into Kinyarwanda and is now being translated into Swahili, to ensure that farmers can access information on alternatives in a language they relate to and understand.

Overall, Kenya's achievements reflect a multi-faceted approach: regulatory reform, policy modernisation, and farmer empowerment through knowledge and alternatives, all advancing the transition toward safer and sustainable agriculture.

GAINS, LESSONS LEARNED AND THE ROAD AHEAD IN PHASING OUT HHPS IN KENYA

PRESENTER: CHRISTINE GATWIRI, COORDINATOR, ROUTE TO FOOD INITIATIVE.

The Heinrich Böll Foundation, through its Route to Food Initiative, has played a pivotal role in addressing highly hazardous pesticides (HHPs) in Kenya by producing knowledge resources and advocating for safer alternatives. Key publications include the Farmer's Resource Guide, which provides practical guidance on safe, sustainable crop production without using HHPs; Toxic Business: Highly Hazardous Pesticides in Kenya, which highlighted HHP prevalence, health risks and recommended alternatives; and the Pesticide Atlas which provides comprehensive statistics on pesticides, detailing those most commonly used, the most hazardous, and their impacts on human health and biodiversity. These resources have been widely disseminated and are available on routetofood.org.

Over the years, these advocacy and awareness creation efforts have contributed to significant progress in policy development in Kenya. The National Agroecology Strategy, launched in late 2024, guides counties in integrating agroecological principles into sustainable food systems. Nakuru, West Pokot, Kiambu, Makueni, and Kajiado, and other counties are adopting or drafting county-level policies and regulations on HHPs.

Notably, Kajiado is set to become the first county in Kenya to regulate pesticide use, as it drafts a county-level agroecology regulation targeting HHPs. This endeavour has been led by one of the Route to Food Initiative partners, the Consumer Grassroots Association, as well as a member of the Route to Food Alliance. Public awareness has grown substantially, with policymakers, farmers, and consumers recognising pesticide reform as both a food safety and rights issue.

At the national level, the Cabinet Secretary recently announced the withdrawal of 77

pesticides, the restriction of 202, and 151 under review, signalling a strong commitment to safer food production.

Yet challenges remain, questions remain on what restrictions of pesticides outlined in policy mean in practice. For instance, if a pesticide is restricted to greenhouse use, how is this enforced in practice? Should farmers show documentation when purchasing restricted products, and what should sellers require to verify eligibility?

These uncertainties highlight gaps in using restriction as a regulatory tool, and ongoing dialogue with the Ministry is needed to clarify and strengthen implementation.

KEY LESSONS FROM THIS JOURNEY INCLUDE:

- Evidence-based advocacy can unlock political action at both national and county levels.

- Multi-actor partnerships amplify credibility and reach; collaboration with networks such as Kenya Organic Agriculture Network, BIBA, and RODI-Kenya has been critical in pushing for policy reforms and knowledge creation. We invite all stakeholders to join us in this effort, recognising that addressing pesticide reform and promoting sustainable agriculture is a collective responsibility that cannot be achieved by any single individual or organisation.

- Framing HHPs as a right-to-food issue resonates with the public and mobilises policymakers effectively. The constitutional right to safe, healthy, and sufficient food highlights the food safety risks posed by HHPs. By presenting pesticides as a violation to this right, stakeholders understand the urgency of reform better.

- Persistent implementation gaps, such as challenges in applying restrictions as a regulatory tool, underscore the need for continuous engagement with State actors. Collaboration is essential as we work to hold the government accountable, raise awareness, and ensure safe food for all.

FOOD RIGHTS POLICY AT NATIONAL AND COUNTY LEVELS: BACKGROUND, IMPLICATIONS, AND THE ROAD AHEAD

PRESENTER: HON. AGOSTINHO NETO, KENYA, PARLIAMENTARY HUMAN RIGHTS ASSOCIATION

FAO projects that food production in developing countries must increase by 80%, driven by higher yields and more frequent cultivation. Pesticides play a role in achieving this growth; however, as the 2017 UN Rapporteur on the Right to Food noted, pesticides can persist in the environment for decades, threatening the ecological systems on which food production depends.

Excessive or improper use contaminates soil and water, reduces biodiversity, destroys beneficial insects, and diminishes nutritional value. FAO recommends a progressive ban on highly hazardous pesticides (HHPs) as the most effective measure, followed by the careful selection of low-risk alternatives and ensuring proper use in accordance with good agricultural practices.

In practice, misuse remains common, as pesticide vendors often lack sufficient knowledge. Governments must therefore balance judicious pesticide use with health and environmental protection, through legislation that includes banning dangerous products, monitoring imports, raising consumer awareness, and tracking health and ecological impacts.

Route to Food Initiative, however, highlighted a critical policy distinction affecting food systems: the difference between food security and the right to food. While related, the two concepts are distinct with different policy and legal implications: Food security concerns the conditions that make food available, while the right to food is a legally enforceable entitlement.

In Kenya, this distinction is critical, particularly in addressing harms arising from highly hazardous pesticides (HHPs), which undermine both environmental integrity and the

realisation of safe, adequate, and nutritious food. Entitlements are what make the right to food justiciable; they define what individuals can legally claim.

Kenya may achieve high levels of production (in Galana Kulalu or the Rift Valley) yet fail to realise this right if communities (in Turkana or Homa Bay) lack access, affordability, quality, or availability of food. This underscores the importance of distinguishing food security and the right to food. More importantly, it highlights the criticality of framing HHPs as a right-to-food issue, as forwarded by the Route to Food Initiative, since this presents HHPs as a violation of the constitutional right to safe, healthy, and sufficient food by showcasing the food safety risks posed by HHPs.

HOW DID WE GET HERE?

The 1996 World Food Summit reaffirmed the right of every person to safe and nutritious food and recognised environmental degradation as a key driver of food insecurity. The use of highly hazardous pesticides (HHPs) undermines ecosystems, contaminates water and soil, and erodes biodiversity, thereby threatening both food security and the right to food, as exemplified by the Deputy Vice-Chancellor's story on the disappearance of fish species due to chemical contamination.

Increased food production must occur within a framework of sustainable natural resource management. Food cannot be produced without regard to environmental sustainability, as responsibility for balancing productivity and protection lies with individual governments. Under the 1996 Rome Declaration, countries committed to creating enabling environments for food security by adopting a Plan of Action, enacting national laws, and developing policies consistent with human rights and fundamental freedoms. This commitment underscored the need for political will to balance agricultural productivity with environmental protection.

In fulfilment of its commitments under the Rome Declaration, Kenya entrenched these principles in its Constitution through Articles 42 and 43, which guarantee the right to a clean and healthy environment and to adequate food and freedom from hunger. These provisions align with the African Charter on Human and Peoples' Rights and the International Covenant on Economic, Social and Cultural Rights, from which several constitutional rights are drawn. As constitutional entitlements, these rights are justiciable, allowing individuals to claim violations where food is inaccessible, unaffordable, of poor quality, or unavailable when needed.

BUT POLICY AND PRACTICE GAPS EXIST

Despite this robust framework, several systemic gaps undermine effective pesticide regulation and food-rights protection in Kenya:

- Regulatory mandates are dispersed across institutions such as the PCPB, NEMA, and KEPHIS, resulting in weak enforcement of bans on HHPs and limited accountability for harms.
- Lack of sufficient transition support for farmers, compounded by a lack of political will in phasing out chemical pesticides and double standards in pesticide regulation.
- Farmers often lack a clear understanding of the risks posed by HHPs, and existing research on these challenges remains fragmented and insufficient, especially on their impact on the environment.

These gaps create a disconnect between constitutional guarantees and lived realities. The continued use of HHPs illustrates this gap between law and practice.

IMPLICATIONS AND THE ROAD AHEAD: JURISPRUDENCE AND ACCOUNTABILITY

The realisation of economic, social, and environmental rights depends on their justiciability. Jurisprudence plays a critical role in translating constitutional rights into enforceable obligations. Kenya has reached a stage where judicial action is necessary to ensure the effective implementation of Articles 42 and 43 of the Constitution.

This principle was demonstrated in the Owino Uhuru case, a landmark environmental and human rights decision addressing lead contamination. The court held regulatory bodies accountable for failing to protect the public and affirmed the constitutional right to a healthy environment. There is no justification for individuals in regions such as Turkana, Homa Bay, or Kwale to suffer from hunger when Article 43 guarantees the right to adequate food. Landmark decisions such as the Owino Uhuru case have demonstrated the judiciary's ability to hold regulators accountable for environmental harm and affirm the right to a clean and healthy environment.

Similar legal reasoning can be applied to harms caused by HHPs. Our role is to develop legislation at both national and county levels that "crystallises" these rights. By this, we mean establishing clear duties and identifying accountable duty bearers, so that economic and social rights are actionable and enforceable. For example, in Uganda, legal frameworks specify authorities responsible for ensuring the right to food, providing a model for county-level accountability in Kenya.

Strategic litigation can enable affected communities to seek remedies against both State regulators and private actors, including agro-companies, strengthening accountability, deterrence, and regulatory compliance. Courts, therefore, have a pivotal role in addressing pesticide-related harms within the framework of the right to food and environmental justice.

The Parliamentary Human Rights Commission has been collaborating with the Heinrich Böll Foundation for six years on two fronts: first, to develop an overarching national right-to-food policy, and second, to support several counties in creating county-specific policy frameworks. This work is crucial because, under the Constitution of Kenya, Articles 42 and 43 - which provide for the right to a clean environment and the right to food - are primarily county mandates, and Kenya's 47 counties bear significant responsibility for translating these constitutional rights into tangible entitlements for their populations, even within a national framework.

We remain committed, together with the Heinrich Böll Foundation, Nairobi and other partners, to advance the realisation of Article 42 (the right to a clean and healthy environment) and Article 43 (the right to quality, accessible food and freedom from hunger) for all Kenyans.

CALL TO ACTION

The way forward requires a deliberate shift toward legislation and policy - at both national and county levels - that "crystallises" the right to food and the right to a healthy environment. Counties, which bear primary responsibility for implementing these rights, must adopt clear legal frameworks defining obligations, enforcement mechanisms, and remedies. At the national level, coherence in pesticide regulation and alignment with human rights standards are essential.

Kenya must translate constitutional rights into enforceable entitlements by strengthening national and county legislation, clarifying regulatory mandates, and advancing jurisprudence on harms caused by highly hazardous pesticides. Civil society, researchers, policymakers, and affected communities must work together to generate

evidence, sustain political pressure, and pursue strategic litigation where necessary. Only through coordinated policy reform, effective enforcement, and legal accountability can Kenya ensure safe food systems, protect biodiversity, and fully realise the right to food for all.

Transformation, however, will not come through regulation alone. It requires political will, advocacy, and evidence that informs decision-making. Science and policy must inform each other, and cross-boundary engagement is crucial. This symposium exemplifies the importance of bridging scientific insight with legal and policy frameworks, ensuring that discussions address both the conditions that enable food security and the entitlements that make the right to food justiciable.

Use and Effects of Pesticides in Kajiado, Nakuru, and Kirinyaga Counties, Kenya

Presenter: Fredrick Otieno, Centre for Environmental Justice and Development

Supporting Entity: Sigrid Rausing Trust

Introduction

This study investigates the use and impacts of pesticides, with a focus on HHPs, in Kajiado, Nakuru, and Kirinyaga counties in Kenya. Globally, pesticides account for an estimated 385 million cases of unintentional poisoning annually, including 11,000 fatalities, and contribute to approximately 150,000 suicides each year. Although HHPs represent only 6 to 10% of registered pesticides, they disproportionately affect human health and ecosystems, with farmers bearing the greatest burden.

Targeted action on this small subset has the potential to prevent numerous poisonings and safeguard farmer health. Importantly, perceptions among farmers, regulators, and industry stakeholders often misattribute pesticide-related harms solely to farmers' practices, overlooking systemic and regulatory factors.

Study Areas

- Kajiado County: Focused on the Amboseli ecosystem, characterised by commercial farming.
- Kirinyaga County: Central Kenya, predominantly horticultural farms for export.
- Nakuru County: Major flower-producing region, known as the "flower basket" of Kenya.

Methodology

The study surveyed over 1,500 farmers and farm workers across 105 villages using the Community Pesticides Action Monitoring (CPAM) approach, an action research method engaging farmers in data collection. Data collection occurred between June and September 2024. Identification of HHPs was performed using FAO/WHO JMPM criteria.

Key Findings

- **Socio-demographic Characteristics:** Education level, often cited as a key factor in improving safe pesticide use, was relatively high among respondents. On average, 43.4% of farmers had completed secondary school education, indicating that knowledge gaps in pesticide safety cannot be attributed solely to low formal education levels
- **Reported Pesticides and HHPs:** The study identified 546 pest control products - 527 conventional and 19 biopesticides - containing 192 active ingredients. HHPs accounted for 32% of products and 16% of active ingredients, with Mancozeb and Abamectin being the most prevalent. Among HHPs, 40% were carcinogenic, 43% reproductive toxicants, and 3% mutagens.
- **Poor pesticide use practices:** 31% do not use personal protective equipment when handling pesticides. Among the remaining 69% who reported PPE use, protection was often incomplete or inappropriate, with many citing items such as gumboots or aprons as their primary form of protection, indicating substantial gaps in effective exposure prevention. Over 60% applied pesticides improperly, often along the wind direction. Hazardous disposal practices, including burning and reusing containers, were common. Notably, 39% of farmers applied pesticides without formal training.
- **Health Effects:** Thirty-six percent of respondents reported acute poisoning within their first year of pesticide use, and 17% reported chronic health issues, including cancer, liver disease, and developmental disorders.
- **Environmental Impact:** 42.5% of products and 15% of active ingredients are toxic to bees, aquatic organisms, birds, or earthworms.
- **Wildlife Poisoning:** In areas of high ecological value, particularly the Amboseli ecosystem, 8% of respondents reported cases of intentional wildlife poisoning using pesticides. This finding signals a significant conservation risk and underscores the need for targeted follow-up studies to assess the extent and impacts of pesticide-related wildlife mortality.
- **Country of Origin:** Of the active ingredients, 37.5% were banned across the globe, and 9% were banned in their country of origin but still exported to Kenya. The details of which specific pesticides these are will be available in the report once it is published.

- A total of 219 companies imported these products, dominated by Bayer, Syngenta, and BASF. 75% of products originated from China, India, and Germany, reflecting a shift in global pesticide trade toward countries with less stringent regulations.
- **Illegal Transboundary Trade:** The study identified evidence of cross-border pesticide movement, with 5% of products registered in Tanzania, likely reflecting porous borders between Kenya and Tanzania, particularly in Kajiado County, which borders Tanzania. More concerning, the origin of 22% of products could not be traced, indicating a substantial risk of illegal, unregistered, or substandard pesticides circulating in local markets and underscoring the need for coordinated cross-border regulatory action.

Conclusion

The study demonstrates widespread use of highly hazardous and banned pesticides in the three counties, coupled with unsafe handling and application practices that significantly heighten exposure risks for farmers, surrounding communities, and the environment. Pesticide poisoning among farmers and farm workers is a common and persistent problem, underscoring the urgency of regulatory action.

In addition, porous borders and weak cross-border controls facilitate illegal pesticide trade, further undermining national pesticide governance and risk reduction efforts.

Recommendations

There is an urgent need to intensify efforts to phase out highly hazardous pesticides in Kenya and across East Africa, underscoring the timeliness of this symposium. While substantial evidence is generated by scientists and civil society, a clear gap remains in government research, uptake and action. To address this, governments should establish mechanisms for the routine monitoring and documentation of pesticide poisoning incidents affecting both human and environmental health, and ensure that such evidence informs pesticide registration, review, and regulatory decision-making.

Strengthened collaboration is essential to curb illegal pesticide trade and address regulatory double standards. This includes deepening both North - South and South - South cooperation, given evidence that pesticides are exported from China, India, and Europe to East Africa. Enhanced international coordination is therefore critical to end the unethical global pesticide trade.

INFLUENCE OF ON-FARM PESTICIDE PRACTICES AND PROCESSING METHODS ON RESIDUE LEVELS IN POTATO TUBERS (SOLANUM TUBEROSUM L.) IN NYANDARUA COUNTY

MILLICENT KANARIO, EGERTON UNIVERSITY

Presenters: Millicent Kanario and Prof. Joseph Matofari, Egerton University

BACKGROUND

Nyandarua is Kenya's leading potato-producing county, contributing approximately one-third of the national output. Potato production in the county is characterised by high pest and disease pressure, particularly early and late blight, driven by prevailing agro-climatic conditions.

To address these pressures and mitigate crop losses, farmers rely heavily on synthetic pesticides, increasing the likelihood of pesticide residues entering the food chain and adversely impacting environmental and human health. Given the centrality of potatoes in Kenyan diets, this study assessed pesticide use and residue dynamics along the potato value chain in Nyandarua County. Specifically, it examined on-farm pesticide application practices, evaluated their influence on residue levels in harvested tubers, and analysed how common post-harvest processing methods affect pesticide residues in potatoes.

METHODOLOGY

The study combined a qualitative survey of pesticide use with laboratory-based residue analysis. A structured survey was conducted among 275 potato farmers in Nyandarua County to document commonly used pesticide products and application practices. Based

on reported use patterns, 13 active ingredients were selected for analysis: imidacloprid, fenitrothion, chlorpyrifos, α-cypermethrin, lambda-cyhalothrin, 2,4-D, atrazine, metolachlor, glyphosate, azoxystrobin, mancozeb, and metalaxyl. Potato tuber samples were collected directly from farms, subjected to common household processing methods - including baking, frying and boiling - and analysed for pesticide residues. Residue extraction followed the QuEChERS method, with analytical determination conducted using GC-MS and LC-MS/MS in accordance with AOAC Method 2007.10. Detected residue levels were assessed against Codex Maximum Residue Limits (MRLs), which are currently adopted in Kenya.

KEY FINDINGS

- **On-farm pesticide use practices**

Pesticide use was nearly universal among surveyed farmers. Fungicides were used by 98.8 percent of respondents, insecticides by 68.2 percent, and herbicides by 28.7 percent. Only 1.2 percent reported not using pesticides. Mixing practices were common, with 54% of farmers combining fertilisers and fungicides, and nearly a third mixing fungicides with insecticides.

Most farmers relied on agro-dealers for guidance on pesticide use (74.8%), while 13.2% depended on peer advice from other farmers. Only a minority followed the manufacturer's instructions.

Application frequencies were generally high, with most farmers spraying weekly (60.8%). Pre-harvest intervals varied widely, with over one third (36.8%) harvesting within three weeks of the last application.

- **Residue levels and compliance with MRLs**

This component analysed produce from farmers who followed the manufacturer's instructions to assess the presence of pesticide residues and whether they exceeded maximum residue limits (MRLs). For herbicides and fungicides, detected residue levels in potato tubers were generally below Codex MRLs for all active ingredients, although higher concentrations were associated with specific practices such as failure to observe pre-harvest intervals or reliance on informal advice. Farmers who sought application advice from other farmers, for example, had the highest levels of atrazine, at 1.86 micrograms per kilogram.

Analysis of the effect of on-farm practices on fungicide residues in potatoes showed that all fungicide levels were below MRLs. Farmers mixing fungicides and insecticides had the highest metalaxyl residues, while those relying on advice from other farmers had the highest azoxystrobin levels. Frequent application of mancozeb-containing products corresponded to the highest mancozeb residues.

Notably, insecticide residues revealed critical risks: fenitrothion and chlorpyrifos - both banned in the EU - exceeded CODEX MRLs in potatoes from Nyandarua County. These findings indicate potential consumer exposure to residues above internationally accepted safety thresholds.

- **Effect of processing methods**

Potatoes were collected to analyse initial residue levels, followed by an assessment of how processing methods reduced these active ingredients. All examined processing methods reduced pesticide residue levels to varying degrees. Frying was the most effective, reducing residues of azoxystrobin by over 90 percent and α-cypermethrin by a similar margin. Boiling, baking, steaming, and roasting also resulted in significant reductions.

CONCLUSIONS

Rising demand for potatoes is likely to drive increased pesticide use. The study found that most farmers in Nyandarua County apply pesticides poorly, leading to elevated residues in potato tubers. Common processing methods like boiling, frying, and roasting significantly reduce pesticide levels, with frying being the most effective.
However, for residues initially exceeding MRLs, processing did not consistently bring concentrations within safe limits, highlighting that household preparation alone cannot fully mitigate risks from improper pesticide use. This finding, in particular, sparked significant public uproar upon publication.

POLICY AND PRACTICE IMPLICATIONS

- Poor pesticide practices lead to elevated residue levels in potatoes, posing health risks to consumers and undermining food safety standards.
- Strengthened farmer training, enforcement of pesticide regulations, and adoption of integrated pest management (IPM) are critical to reduce residue contamination.
- Common cooking methods (especially frying) reduce pesticide residues, but safe on-farm pesticide use remains the most effective preventive measure.

CALL TO ACTION

Policy Makers:

- Strengthen training and extension services on the safe use of pesticides.
- Promote Integrated Pest Management (IPM) and organic alternatives.

Regulatory Bodies:

- Implement regular residue testing at the county and national levels.

- Review and enforce pesticide registration and MRL compliance. Consumer and Industry Awareness:
- Develop programs to raise awareness of food safety and responsible pesticide use.

OP-ED

“The publication of our study on pesticide residues in Nyandarua County potatoes sparked intense political backlash. Local leaders accused us of undermining the potato industry, taking their concerns directly to Parliament rather than seeking clarification from the researchers. Ultimately, we presented our findings before the Senate Standing Committee on Agriculture, Livestock, and Fisheries, where the value of evidence-based science was recognised.
The discussion revealed a deeper problem: the influence of business and political interests in pesticide regulation. While some harmful chemicals are banned, many are legally available, driven by powerful networks of importers and political allies. This is not

limited to pesticides, and issues such as antimicrobial resistance and mycotoxins highlight similar systemic challenges.

Our study underscores that effective food safety policies require more than regulation. They demand political will, transparent communication, and engagement through the entire value chain. Without these, even robust science cannot protect consumers. Effective risk communication and coordinated action from producers to policymakers are essential to safeguard public health.”

AGROECOLOGY BEYOND SMALL-SCALE FARMS: A SUCCESS STORY BY MARIE NG'ANG'A, MARIDADI FARM

MARIE NG'ANG'A, MARIDADI FARM

Marie, an agroecology farmer, turned a lifeless, dry plot in Nanyuki into a thriving, biodiverse farm. When she and her husband first saw the land, her mother asked, "Are you sure anything can grow here? This looks like a desert." The soil was compacted, there were hardly any trees, and no birds were in sight. Marie admits they doubted themselves and were wondering if farming here was even possible.

Yet, despite the daunting start, they were committed to the journey and decided to farm agroecologically. They committed to regenerating the land: no shortcuts, no chemicals, just patience and care. They added compost, used biofertilisers, intercropped, and planted cover crops. Birds returned. Life returned. The soil came alive—teeming with worms, insects, and roots. The land transformed, and they challenged themselves to produce food. Today, they grow over 45 crops, feeding local markets, households, and export chains. Their aim is not niche produce but to demonstrate that agroecological farming works at scale.

Their approach is guided by five agroecological principles, which they share with other farmers aiming to implement agroecology at scale.

- **Farm the soil, not the crop**

Healthy soil is the foundation of healthy harvests. If you have good soil, you will have good crops. Because the land was compacted, Maridadi Farm had to undergo deep tilling at the start, but they committed that it would be the last time. From then on, only minimal tillage was done. They became masters at producing compost to feed the land, and covered empty spaces - even with cardboard boxes - to avoid leaving soil bare. Season after season, the soil required less from them, yet continued to produce healthy crops.

- **Celebrate biodiversity**

Pollinators, intercropping, and crop diversity reduce pests and diseases. “We needed pollinators, so we called the bees back by planting sunflowers. We started intercropping combinations we had never imagined, planting watermelon and *kunde*, which protected the watermelon from fruit flies, eliminating the need for pesticides. We also grew grass to keep soil covered, and the more diversity we maintained, the fewer pests and diseases we faced,” Marie says.

- **Close the loop**

At Maridadi Farm, waste is recycled and reused. Crop residues are fed to the livestock, whose manure is composted to enrich the soil. Roots are left in place to nourish microbial life. Even the weeds become food once they are fermented to feed the crops. Pesticides and chemical fertilisers are unnecessary.

- **Care for people**

Workers are provided with nutritious meals, which improves their performance and well-being. Access to fresh, organic food allows them to experience its taste and benefits firsthand. Worker input is valued, and traditional knowledge has proven invaluable in guiding the farm’s practices. No harmful chemicals are used, with natural alternatives such as garlic and chili protecting the crops. Tools and processes are continuously improved to reduce physical strain and increase efficiency, including adaptations for weeding. Agroecology emphasises care for people, soil, and nature. It protects workers from toxins, supports their health, and fosters pride and safety on the farm, which in turn enhances productivity.

- **Continuous learning and sharing**

Learning and teaching are regenerative acts that strengthen the people and the land. This principle has enabled expansion from a 60-acre farm to nearly 1,000 acres and inspired neighbouring commercial farms facing pest and disease challenges. Maridadi Farm now mentors farms seven to ten years old - when soil collapse and “super diseases” typically emerge - demonstrating that commercial-scale farming is possible without pesticides or chemical fertilisers. For example, a basil farm threatened by Fusarium wilt recovered within three months through agroecological practices, producing healthy crops for export markets.

Agroecology, Marie says, is not limited by scale. With intention, care, and biodiversity, it produces nutrient-dense food profitably, protects ecosystems, and nurtures sustainable communities. Her farm is living proof: whether half an acre or a thousand, agroecology works.

SESSION THREE: REGIONAL ROUNDTABLE PESTICIDE POLITICS - COMMON CHALLENGES, DIFFERENCES AND COOPERATION

Chair: Dr. Harun Warui, Heinrich Böll Foundation, Nairobi

SESSION OVERVIEW

The regional roundtable focused on the politics of pesticides in East Africa, exploring seven interrelated themes. Discussions examined government efforts to support the withdrawal or reduced dependency on highly hazardous pesticides (HHPs) by farmers, and considered where responsibility lies for pesticide misuse, weighing the role of systemic factors against individual practices.

The session highlighted the role of science in strategic litigation, drawing on insights from the 2022 petition against the Agrochemical Association of Kenya, and explored how legal and human rights frameworks can be leveraged to hold governments and corporations accountable while protecting citizens' right to safe food.

Investigative journalism was identified as a powerful tool for influencing long-term shifts in pesticide use practices among consumers and farmers, while the intersection of

pesticide use, nutrition security, and public health in Uganda underscored the complex links between food safety, dietary quality, and population health outcomes. Finally, the discussion addressed gaps in translating scientific evidence into effective pesticide regulation in Tanzania, emphasising the need for stronger integration of research into policy and governance. Key takeaways from the session are summarised below.

KEY TAKEAWAYS

- While Tanzania has established regulatory frameworks and announced the phase-out of 44 HHPs, in practice, these policies prioritise plant health management over reducing HHP use, resulting in limited action, delayed implementation, and minimal support for alternatives - highlighting a gap between policy announcements and effective outcomes.
- African farmers should not be blamed for pesticide misuse; systemic factors such as inadequate training, weak regulation, limited support for sustainable practices, and the influence of pesticide corporations create the risks, while farmers bear the consequences.
- Science provides the evidence base to document the harmful effects of highly hazardous pesticides, inform safer alternatives, and underpin strategic litigation that holds manufacturers accountable, demonstrating that legal and policy change must be grounded in robust scientific data.
- Legal and human rights frameworks can hold governments and corporations accountable, promote harmonised regional policies, and empower advocates to protect citizens' right to safe and adequate food, but success requires strategic, proactive action combined with good governance and community participation.
- Investigative journalism can drive long-term shifts in pesticide practices by combining storytelling that exposes health and environmental risks with the promotion of practical, safer alternatives, empowering both farmers and consumers to make informed choices.
- Pesticide use in Uganda poses complex risks, undermining both nutrition security and public health, as contaminated food can compromise nutrient intake, increase disease burden, and perpetuate poverty, highlighting the need for integrated approaches that ensure food quality, safety, and farmer well-being.
- Scientific evidence on pesticide risks in Tanzania often fails to inform regulations due to short-term productivity priorities, weak policy enforcement, political interference, and inequitable protection for local farmers, highlighting the need for stronger integration of science into policy-making and long-term environmental monitoring.

STATUS OF SUPPORTIVE GOVERNMENT POLICIES IN TANZANIA ON HHPS

DR. VERA NGOWI, MUHIMBILI UNIVERSITY, TANZANIA

When asked about Tanzania's supportive policies toward reducing dependency on Highly Hazardous Pesticides (HHPs), Dr. Vera Ngowi from Tanzania's Muhimbili University expressed scepticism. She noted that despite reports and announcements, HHPs remain in use. I was actually surprised to hear the phrase 'supportive policies,'" she said
In reality, we have not advanced in reducing them." She explained that although the government, with FAO support, conducted research identifying 44 HHPs and publicly reported, in Parliament and the media, that it was working towards their phase-out, follow-up action has been limited.

Earlier regulatory frameworks under the Tropical Pesticide Research Institute (TPRI) were effective in controlling pesticides. However, regulatory authority later shifted to the Ministry of Agriculture, driven by its engagement with international phytosanitary bodies whose frameworks required ministerial oversight.

She noted that the Ministry of Agriculture soon recognised its limited capacity to regulate pesticides and requested TPRI to continue performing this role. While TPRI carried out its mandate effectively, the ministry eventually decided to withdraw TPRI's regulatory authority. As a result, pesticide control was transferred to the Tanzania Plant Health and Pesticides Authority (TPHPA), established in 2020 under Act No. 4 of 2020 to regulate plant health, pesticides, and phytosanitary measures.

Dr. Ngowi observed that TPHPA's primary focus on plant health and pesticide use has created little incentive to phase out HHPs and has constrained the promotion of alternative, non-chemical approaches. Reflecting on these developments, she questioned whether the existing framework truly supports HHP reduction.

Other frameworks, including pesticide management guidelines developed by the Ministry of Health in collaboration with WHO, exist, but Dr. Ngowi emphasised that government commitment often remains rhetorical: “We know we are signatories, but we are still thinking about it.”

She also highlighted efforts under the One Health approach, coordinated by the Prime Minister’s Office. "After the conference held in November 2024, we produced a policy brief outlining key recommendations, including the need to ban the 44 HHPs".
While the brief was welcomed and a task force was formed to address the issues, a year later, no action has been taken. Stakeholder engagement has been selective, with the government reportedly waiting for CropLife to propose alternatives to phase out HHPs - leaving other relevant actors sidelined.

Dr. Ngowi concluded that while regulatory frameworks exist, they often prioritise management over support for HHP reduction. She stressed the importance of regional collaboration, noting the ongoing discussions with Kenya and Uganda on harmonised approaches, yet questioning whether policy announcements truly translate into effective action.

The moderator, Dr. Warui, underscored this point: “Dr. Ngowi has highlighted the gap between regulatory management and genuine support. Announcements of HHP withdrawal do not always result in actual reduction, a challenge highly relevant across the region.”

RESPONSIBILITY FOR PESTICIDE MISUSE IN AFRICA

Elizabeth Atieno, a food sovereignty campaigner at Greenpeace Africa, emphasised that African farmers should not be blamed for pesticide misuse, arguing that they are working within a fundamentally flawed system. “When you have a failed system, you don’t blame the people who have been forced to live in it. What you’re supposed to do is fix it,” she said.

Drawing an analogy to healthcare, she explained that just as patients are not blamed when given the wrong medication, farmers should not be blamed for using hazardous pesticides since they are simply operating within a failed system. "We should call it premeditated outcome; if you set up a farmer for failure, they will fail."

Elizabeth highlighted several systemic issues contributing to pesticide risks: inadequate training, weak regulation and enforcement, and limited access to sustainable practices.

She noted that much of the on-the-ground training is provided by pesticide corporations, raising concerns about conflict of interest, while government enforcement often fails to follow through. She also stressed the importance of farmer-led, sustainable solutions and funding alternatives. “Farmers hold a lot of knowledge. Are we really listening to them?

Are we investing in agroecology, or just talking about transition without funding it?” Elizabeth posed.

Despite the existence of agroecology policies at local and national levels, she warned that without genuine investment in agroecology, strengthened enforcement, and support, farmers cannot successfully transition.

She placed accountability squarely on actors with systemic power influencing the food system: corporations controlling pesticide formulation, distribution, and training. “We cannot sit here and blame farmers for an unsafe food system that has failed them. Farmers are not the cause of the risks. We are seeing them pay the price of pesticides.”

THE ROLE OF SCIENCE IN STRATEGIC LITIGATION: INSIGHTS FROM THE 2022 PETITION AGAINST THE AGROCHEMICAL ASSOCIATION OF KENYA

KELVIN KUBAI, LEAD PETITIONER THROUGH THE AFRICA CENTRE FOR CORRECTIVE AND PREVENTIVE ACTION (ACCPA)

Kelvin Kubai, lead petitioner through the Africa Centre for Corrective and Preventive Action (ACCPA) in Petition E048 of 2022, emphasised that science has been central to the petition’s success.

“Science has been a quintessential component of our litigation,” he said, noting that the case relied heavily on findings from the Route to Food Initiative

and other scientific reports. He challenged the misconception that opponents of HHPs are “anti-science,” stressing instead that science can identify safe alternatives that protect farmers, consumers, and ecosystems.

The petition targeted the Agrochemical Association of Kenya, including major distributors such as Bayer, Syngenta, and BASF, for their role in marketing HHPs in Kenya. In a landmark ruling on 18th September, 2022, Justice Kemei recognised the health impacts on Kenyan users and allowed the petition to expand into a class action suit.

Following the ruling, Kubai described a forensic investigation involving 70 small-scale farmers and flower farm workers in Timau and Naivasha. Blood and urine analyses revealed alarming levels of paraquat and glyphosate, with paraquat levels far exceeding safe limits.

He explained that “the human body is supposed to have zero units of paraquat,” noting that even minimal exposure forces the body to expend significant energy attempting to break it down. This process generates intense oxidative stress, with serious implications for health. He emphasised that the presence of paraquat in the body severely diminishes the quality of life and can dramatically shorten life expectancy. “In a nutshell, many of our farmers out there are walking dead.”

The Agrochemical Association of Kenya responded to the petition by arguing that proper use of pesticides prevents harm, effectively shifting responsibility to farmers and consumers. Kubai countered: “If you are blaming the very farmers you sell to, because they are supposedly illiterate, then you are admitting they should not be part of your market in the first place.” He highlighted the need for extended producer responsibility, noting that many farmers do not understand exposure pathways, such as dermal absorption, and rely on unsafe practices like drinking milk after spraying. Producers have a responsibility to break down the science in a manner that farmers can understand.

Kubai concluded that science not only documents harm but also informs safer alternatives. “These 70 cases would not be before the court if farmers had access to safe alternatives. Science gives us the evidence and the solutions.” Looking ahead, the decision by the court is expected to play a pivotal role in shaping accountability within the pesticide sector. It was emphasised that legal outcomes can create powerful economic incentives, compelling manufacturers to reassess the continued sale of harmful products. If courts award damages to affected farmers and users, companies may be forced to choose between persisting with hazardous pesticides or investing in safer alternatives.

As Kubai noted: “Sometimes, to force manufacturers to do the right thing, we must compel them through economic decisions.” He underscored that achieving meaningful change requires a multifaceted approach, bringing together scientists, doctors, lawyers, and policymakers. However, the process must begin with science, which informs the law, and is ultimately reinforced through advocacy.

USING LEGAL AND HUMAN RIGHTS FRAMEWORKS TO PROTECT CITIZENS FROM UNSAFE PESTICIDES

DR. DAVID KABANDA, EXECUTIVE DIRECTOR OF THE CENTRE FOR FOOD AND ADEQUATE LIVING RIGHTS

Dr. David Kabanda, Executive Director of the Centre for Food and Adequate Living Rights, emphasised the role of law and human rights in holding governments and corporations accountable for unsafe pesticide use. He noted that Kenya is ahead in regulatory and accountability actions through court cases and stressed the need for Uganda and Tanzania tofollow suit: “We cannot afford to waste the momentum Kenya has built. At the very least, the 77 banned HHPs must never find their way into any East African country.”

Dr. Kabanda also highlighted his personal experience as a farmer and advocate, cultivating food agroecologically. “If everyone practiced agroecology, as my sister from Maridadi Farms demonstrated, we could transform Africa,” he said. When asked how legal and human rights frameworks can be used more effectively to hold governments and corporations accountable for the harms caused by unsafe pesticide use, Dr. Kabanda argued that good governance and accountability are essential for advancing agroecology and effective pesticide control.

Advocates should be proactive: “One of the principles of war is this: you do not wait for the war to come to you; you take the war to them.” He recounted training members of the East African Legislative Assembly, challenging them on their own exposure to pesticides. “All of us here have been eating: are you certain you did not consume pesticides in the tomatoes you ate for lunch?” He then urged them to create harmonised regional laws to prevent companies from exploiting weaker regulatory systems in neighbouring countries. “Working in silos will not get us where we want to go. Now that Kenya has banned HHPs, profit-driven companies will simply shift production, distribution, and marketing to Uganda or Tanzania. At the very least, we need a harmonised East African–level policy and legal framework,” he said.

Dr. Kabanda concluded that legal and human rights frameworks must emphasise participation, accountability, and strategic action. “Whether we like it, we must fight, and we must fight strategically,” he said, reinforcing the importance of combining legal action, advocacy, and science to protect citizens’ right to safe and adequate food.

INFLUENCING PESTICIDE PRACTICES THROUGH INVESTIGATIVE JOURNALISM

MERCY CHELANGAT, SENIOR REPORTER ON PESTICIDES AT NATION MEDIA GROUP

Mercy Chelangat, senior reporter on pesticides at Nation Media Group, emphasised that investigative journalism goes beyond exposing risks and can drive long-term behavioural change in pesticide practices among farmers and consumers. “Our most powerful tool has always been storytelling,” she said. Storytelling informs and educates, highlights gaps, and exposes the risks communities face, from farmers to everyday consumers. By sharing the experiences of those affected, journalists make the dangers of chemicals like mancozeb and paraquat tangible: the potential for cancer, Parkinson’s, neuropathy, and other long-term health impacts associated with exposure to pesticides.

Mercy illustrated the personal impact of these risks, recounting conversations with parliamentarians contributing to colleagues undergoing cancer treatment. “Our leaders can now see that they are not safe. Nobody is safe,” she noted.

Investigative reporting also reveals contradictions in farming practices: conventional farmers often maintain separate parcels - one organic for family consumption and another for market sale using hazardous pesticides. “They forget that their child is in boarding school, and the school will buy those same tomatoes grown with chemicals."

She stressed the importance of exposing double standards and showing alternatives.

“Even if you avoid tomatoes with mancozeb, you might inhale herbicides at a golf club.” Holding power to account through storytelling means helping people understand that the challenges facing the ordinary mwananchi are not distant - they are shared and will eventually reach every household. In Mercy’s view, risk exposure is essential: "our most powerful tool is storytelling - stories that unsettle people enough to compel them to act."

Beyond exposing risks, investigative journalism must also show viable alternatives. Farmers need to hear not only that certain practices are dangerous, but that safer options exist. By highlighting agroecological approaches, farmer-built structures, and locally made biopesticides, journalism can demonstrate practical solutions already in use.

Examples of farmers succeeding with organic production - even in challenging environments - show that these approaches are feasible and sustainable. In this way, investigative journalism can drive long-term change in pesticide practices by revealing risks while simultaneously amplifying workable alternatives.

INTERSECTION OF PESTICIDES, NUTRITION SECURITY, AND PUBLIC HEALTH IN UGANDA

BERNARD BWAMBALE, HEAD OF PROGRAMS AT THE GLOBAL CONSUMER CENTRE IN UGANDA AND A PUBLIC HEALTH NUTRITIONIST

Bernard Bwambale, Head of Programs at the Global Consumer Centre in Uganda and public health nutritionist, highlighted the complex interplay between pesticide use, nutrition security, and public health outcomes. He explained that interventions intended to improve nutrition can inadvertently introduce health risks when food is contaminated with HHPs. For example, replacing sugar with honey may seem healthier, but bees may be exposed to pesticides, potentially contaminating honey. Similarly, encouraging vegetable consumption for micronutrients may inadvertently expose consumers to carcinogenic

compounds. “You are preventing a nutritional deficiency with food that may be introducing another carcinogen,” he noted.

Bernard also emphasised that food availability does not guarantee nutritional adequacy. Despite relatively sufficient production in Africa, as advanced by FAO, malnutrition and stunting persist because food quality is compromised.

He expounded that food insecurity today is not only about quantity but quality, noting that “we are dealing with a situation where food is available in sufficient amounts, yet its poor quality fails to meet the nutritional needs of the population.”

He raised questions about whether pesticide use affects nutrient content, citing studies showing reduced macronutrients like proteins in sprayed crops and highlighting the need for further research on micronutrients.

Building on this observation, Bernard drew a critical distinction between food security and the right to food. While food security focuses on availability and access, the right to food emphasises adequacy, safety, and quality. As a result, a country can appear food secure while still failing to fulfil the right to food. Food may be available and accessible, yet nutritionally inadequate or unsafe.

He further explained that in contexts where food is produced in sufficient quantities, but poverty persists, the underlying drivers are often overlooked. High production costs - driven by reliance on pesticides, fertilisers, and other inputs - leave many farmers with limited income. As these costs increase, food prices rise, placing nutritious food beyond he reach of many households. Consequently, food insecurity persists despite apparent abundance.

Bernard illustrated this with the example of a tomato farmer. After investing heavily in production, the farmer may sell their produce and earn a modest income. However, pesticide exposure can lead to serious health problems - respiratory issues, skin damage, or internal organ complications - forcing the farmer to spend their earnings on medical treatment. In extreme cases, they may even have to sell their land to cover treatment costs. Ultimately, after all the effort, the farmer is often left with neither the food nor the income they worked so hard for.

He concluded that the challenges of production, nutrition, food security, food safety, public health, and poverty are deeply interconnected, underscoring the need for integrated approaches to protect both consumers and farmers while maintaining agricultural productivity.

BRIDGING SCIENCE AND POLICY IN PESTICIDE REGULATION IN TANZANIA

Dr. Raphael John Mwezi, environmental and food safety scientist at the Tanzania Plant Health and Pesticide Authority (TPHPA), highlighted several key gaps preventing scientific evidence from informing stronger pesticide regulations nationally and regionally.

He first noted that the public and policymakers often prioritise short-term agricultural productivity over long-term health and environmental impacts. “This trend is reflected in many policies, not only in Africa, but across much of the developing world, where increasing yield is prioritised over addressing the health burden pesticides impose on farmers,” he said.

A second gap is the weak link between policy and action, which Dr. Mwezi describes as a paradox. Those who design policies often lack direct knowledge of pesticide burdens on farmers, while scientists and experts with relevant evidence are sometimes excluded from policymaking or even perceived as threats.

Enforcement in Tanzania is constrained by limited resources and weak legal backing for district-level agricultural and health officers, while farmers remain unaware of existing regulations, creating a cycle of ignorance from policymakers to end users. “As a result, efforts to address pesticide use are uncoordinated, and the burden falls mainly on small-scale farmers. The scenarios we observed earlier regarding improper or incomplete use of PPEs are exactly what we see in Tanzania as well,” he said. Dr. Mwezi also pointed to inequities in regulatory focus. Policies often target export-oriented horticultural crops, leaving locally consumed vegetables less protected. Although the Plant Health Act mandates TPHPA to protect domestic consumers, implementation is inconsistent.

"Implementing the Act has been another challenge. The question is: who takes responsibility?" he posed. Similarly, fast-tracking of pesticide registration raises questions about whether safer alternatives, such as agroecology, are being overlooked. Additionally, export-focused standards often restrict harmful pesticides like mancozeb for European markets, yet these provisions are not extended to smallholder farmers, leaving them unprotected.

He further highlighted political interference in science as another issue hindering the translation of scientific evidence into effective pesticide regulations. Scientists reporting toxic substances face obstacles. “Some scientists are punished for exposing the truth,” he said.

The authority to declare health or environmental risks often lies outside the scientific domain. “You can report a highly toxic substance with serious health and environmental implications, but the authority to officially declare it lies elsewhere within the ministry. As a scientist, the question becomes: do you publish your findings, or do you wait?”

This undermines the translation of scientific research into effective regulatory action, hence Dr. Mwezi’s recommendation that East Africa’s policy and regulatory frameworks should be revisited to ensure that scientific evidence effectively informs pesticide regulation and decision-making.

Finally, Dr. Mwezi underscored limited political and policy support for long-term environmental monitoring. Drawing on a TPHPA-University of Oslo study, he noted that even historical interventions, like DDT use for malaria control in the Pare-Taveta region, lacked mechanisms to monitor environmental persistence, with consequences persisting decades later.

This reflects a lack of long-term political commitment to environmental and public health monitoring. He concluded that addressing these gaps requires revisiting policy and regulatory structures to better integrate scientific evidence and ensure protection for farmers, consumers, and ecosystems.

The moderator, Dr. Warui, summarised: “Dr. John has clearly linked politics and science, showing how political processes often fail to acknowledge scientific evidence, highlighting the urgent need for systemic reform in pesticide governance across the region.”

SESSION FOUR: ROUNDTABLE: CURRENT PESTICIDE USE AND VIABLE ALTERNATIVES

Chair: Collins Othieno, Executive Director, Community Rehabilitation and Environmental Protection Programme (CREPP)

SESSION OVERVIEW

This session featured practical farmer experiences, with farmer leaders sharing first-hand perspectives on the health and environmental impacts of HHPs, farmer-led adoption of agroecological alternatives - particularly biopesticides - and the key barriers and enablers influencing the uptake of these alternatives. Key takeaways from the session are outlined below.

KEY TAKEAWAYS

- **Health effects of HHPs**
  Exposure to highly hazardous pesticides can result in severe and irreversible health impacts, including complete skin loss, loss of fingernails and toenails, and permanent vision impairment. As testified by Isaac Njuguna, such exposure can be life-threatening and leads to substantial economic burdens from medical treatment, alongside long-term disruptions to livelihoods and quality of life.
- **Effectiveness of Locally Made Biopesticides and Biofertilisers**
  Locally made biopesticides and biofertilisers are viable and effective, with options such as tithonia, ash brew, bokashi, and compost significantly reducing pest pressure while remaining affordable and accessible.

- **Knowledge Sharing**
  Agricultural extension systems can be transformed from conventional approaches through sustained engagement, with farmer forums and on-farm demonstrations of successful agroecological practices to influence extension officers and local leaders to support and promote agroecological alternatives. Peer learning accelerates adoption, as farmers share experiences and demonstrate results within their communities.
- **Farmer-Led Research as a Driver of Adoption**
  Farmer-led research is an effective pathway for change, enabling farmers to test, adapt, and adopt alternatives directly, resulting in the rapid uptake of biopesticides.
- **Environmental effects of HHPs**
  Many farmers still rely on pesticides at planting, including chemicals like Roundup that harm rivers, wildlife, and ecosystems. Large-scale farms use Roundup and other industrial chemicals, which contaminate rivers and ultimately flow into Lake Victoria.
- **Nature provides the most effective and sustainable model for healthy, resilient farming**
  Chemical use degrades soil since industrial fertilisers kill beneficial bacteria and fungi, creating lifeless soils and hardpans that limit root growth. By enriching soil biologically with microorganisms, crops develop natural immunity, higher sugar content (high Brix), and stronger pest resistance. Soil health is a key foundation of sustainable farming.

Speakers:

- Mr. Isaac Njuguna, Farmer Leader, Slow Food Kenya, Nakuru County
- Ms. Caroline Anyona, Farmer Leader, CREPP, Kisumu County
- Mr. Caleb Omollo, Farmer Leader, Migori County

Victim Testimony: The Health Cost of Highly Hazardous Pesticides

I am Isaac Njuguna, a farmer from Nakuru County and a farmer leader with Slow Food Kenya. I've farmed for over 20 years, both independently and commercially. Today, I am alive, but the journey has been devastating. I do not use pesticides on my own farm, but at my place of employment, I was heavily exposed. I was asked to mix chemicals and clean unlabelled containers. Some of these chemicals were extremely hazardous. Before long, I experienced itching, nausea, and vomiting. When I reported this to my boss, I was threatened with dismissal. At work, chemicals were sprayed from an aeroplane with only one seat for the pilot. I was transported inside a large, unventilated chemical tank, often on the verge of suffocating during flights across Nandi, Kericho, and Elementaita. Eventually, my skin peeled completely, I lost all my fingernails and toenails, and my vision was impaired. I spent two months in the hospital, in critical condition, on life-support machines. Even now, I have no nails, and my vision remains impaired.

After discharge, I was fired from my job, and all the support stopped. Only a Good Samaritan and an uncompromising lawyer helped me navigate through the long legal battle. My employer initially acknowledged exposure but then attempted to discredit me and interfere with evidence. Eventually, investigations proved negligence: no protective gear had been provided, and my transport in a chemical tank caused the severe health impacts I live with. My employer was penalised, but the healing process was long, painful, and expensive. Millions of shillings have been spent on my treatment, and some effects, like loss of vision, are permanent.

Returning to my farm, I embraced organic practices. I now advocate for chemical-free farming, demonstrating safer alternatives such as mulching instead of herbicides. I share my story in schools, village barazas, and on social media platforms, emphasising that pesticide exposure destroys lives and causes lifelong suffering.

Legal Battle

My employer tried to silence me when I was still in the hospital and fired me while I was still in critical condition. The case revealed that there was negligence on their part. This fight demonstrated that unity and persistence can overcome intimidation by powerful corporations.

Parting Message

Change must start with us. Education about chemical-free food must begin with children. Communities must prioritise safe farming and eating practices. No one should suffer the way I have. We cannot allow intimidation, fear, or profit motives to override human safety. We must speak out, advocate for chemical-free farming, and protect the next generation.

FARMER-LED BIOPESTICIDE ALTERNATIVES: A PRACTICE-BASED NARRATIVE

Speaker: Ms. Caroline Anyona, Farmer Leader, CREPP (Kisumu County)

In my community, many farmers still rely on pesticides at planting. They apply chemicals like Roundup that harm our rivers, animals, and environment. I chose a different path. I am proud to be an organic farmer, and through my work with CREPP and the county government, I have learned how to produce and use locally made biopesticides and biofertilisers.

We make them ourselves and apply them directly to our vegetables and maize. Through farmer-led research, we test them on our own farms, observe the results, and adopt based on what we see. One biofertiliser we use widely is tithonia, which we apply to vegetables and maize. It has significantly reduced pest pressure. We also use ash brew, made with soap, which has proven highly effective as a biopesticide. Other farmers in our area use bokashi and garden compost, all of which strengthen crops and are not harmful to people and nature. These alternatives are not theoretical - they work. They are affordable, locally available, and effective.

As we shared our results, especially with women farmers, many stopped using chemical pesticides altogether. Farmers are now shifting to organic production of maize and vegetables because they have seen the results. I am proud of the NGOs working with us since they do not impose solutions but walk with farmers, support trials, learn, and adopt.

Agricultural extension officers often promote chemicals because that is how they were trained. Rather than exclude them, we involve them in farmer forums and field demonstrations. When they see organic practices working in real conditions, attitudes begin to change.

Through networks like the Farmer Research Network, extension officers visit farms, observe biopesticides in use, and they eventually adopt and promote these approaches.

I have been invited to train farmers, extension officers, and even local leaders. Assistant chiefs now call us to community forums to share this knowledge. This shows that farmer-led research can influence both farmers and extension systems.

These experiences prove that viable, locally made biopesticide alternatives already exist. When farmers are supported to test, demonstrate, and share knowledge, adoption follows. Farmer-led research is also helping us to adapt to climate change and build farming systems that truly serve our communities.

EFFECTS OF HHPS AND VIABLE ALTERNATIVES

Mr. Caleb Omollo, Farmer Leader, Migori County

What are some of the effects of highly hazardous pesticides on farmers' health, agriculture, and the local economy in your area? What alternatives have worked in your experience?

In Migori County, large-scale farms like Sony Sugar use Roundup and other industrial chemicals, which contaminate rivers and eventually flow into Lake Victoria. I am an expert in permaculture, regenerative agriculture, and agroecology. What I teach is simple: when soil is well cared for and provided with the right micronutrients, pests naturally decline - chemicals are unnecessary.

Chemical use destroys the soil. Industrial fertilisers contain salts that kill beneficial bacteria and fungi, creating lifeless soil and hardpans that prevent deep root growth. In permaculture and tropical agroforestry, we work with soil microorganisms. By enriching soil biologically, crops develop natural immunity, higher sugar content (high Brix), and resist pests.

Nature provides the best model - just like Kakamega Forest thrives without chemicals. Trees, plants, and microorganisms recycle nutrients, enhance photosynthesis, and restore soil health. When we farm in harmony with these natural processes, pesticides become unnecessary, crops remain vibrant and healthy, and ecosystems recover.

What actions should stakeholders take to reduce or avoid highly hazardous pesticides?

While multinational corporations sell highly toxic chemicals, affordable, locally available, biodegradable alternatives already exist. We can also use beneficial insects and plants

that naturally repel pests. By working with nature and following ecological principles like succession, pests can be managed effectively without chemicals. For example, with armyworms on maize, spraying only water eliminates them within two days - no chemicals needed. Integrated pest management strategies are both affordable and accessible.

Indigenous knowledge provides additional solutions. In Rongo, near Kisii, I met women over a hundred years old who have never used chemicals. They credit their health to indigenous crops like avocado, banana, pumpkin, and traditional vegetables, which are naturally pest-resistant and nutritious.

On the farm, integrating beneficial fruits and vegetables is valuable, but soil health remains the foundation. Healthy soil bacteria and fungi produce nutrients for plants and people. Compost is the best fertiliser as it sustains this natural cycle and enriches soil sustainably.

BIOFERTILISERS: SHORT-TERM EFFORT, LONG-TERM GAIN

With chemical fertilisers, farmers must apply the same inputs repeatedly yet yields often decline while chemical use increases. In contrast, bio-inputs and biofertilisers restore the soil's natural structure - almost like returning it to forest soil. While the first one or two years can be labour-intensive, by the third year the soil becomes naturally fertile, reducing the need for additional inputs. The challenge is shifting farmers' focus from quick fixes to long-term soil health.

SESSION FIVE: INSIGHTS FROM ON-GOING FIELD RESEARCH

Chair: Stephen Okumu Ondere, Maseno University

SESSION OVERVIEW

This session showcased the research contributions of PhD and Master's students from the NORHED-funded AnthEM program, who presented emerging findings from their ongoing field studies on HHPs. The presentations highlighted the value of academic research in providing evidence-based insights to guide policy and practice. Their work underscores the critical role of the next generation of scientists in shaping sustainable agriculture and influencing policy at local and regional levels.

Speakers

- **Speaker:** Kevin Oware, University of Nairobi
  Title: (Un)Common voices from the ground? Smallholder farmers' perspectives on the use of pesticides in western Kenya.
- **Speaker:** Leo Okoyo, University of Nairobi
  Title: Socio-ecological dimensions of pest management practices among smallholder tomato farmers of Northern Uganda.
- **Speaker:** Antonio Mosetti, Sapienza University, Rome
  Title: Pesticides as instruments of (un)certainty among farmers in Meru District, Arusha, Tanzania
- **Speaker:** Edwin Ondiege, Ghent University
  Title: The sick organic? A preview of farmer vulnerabilities and resilience within the (in)organic pesticide industry in Tanzania
- **Speaker:** Tausi Feruzi, Maseno University
  Title: Pesticide-associated waste: practices, perceptions, and consequences among small-scale farmers in Kilosa District, Tanzania
- **Speaker:** Lulu Tessua, University of Nairobi
  Title: Stakeholders of revolutionary agriculture: when alternative farming contradicts sustainable and eco-friendly practices.

PRESENTATION BRIEFS

(UN)COMMON VOICES FROM THE GROUND? SMALLHOLDER FARMERS' PERSPECTIVES ON THE USE OF PESTICIDES IN WESTERN KENYA.

Speaker: Kevin Oware, Third-year PhD student, University of Nairobi, on Secondment from Maseno University

ABSTRACT

This study draws on nine months of ethnographic fieldwork in Muhoroni sub-County, Kisumu County, focusing on smallholder farmers. Muhoroni, a historically intensive agricultural region producing sugarcane, maize, rice, cotton, and vegetables, provides a diverse context to examine pesticide and synthetic fertiliser use. The study explored everyday farming practices and farmers' perceptions of the health and environmental impacts of agrochemical inputs.

Findings reveal extensive dependency on agrochemicals, with herbicides commonly used to control weeds, often replacing manual labour. Agrochemicals are applied across multiple crops and stages, resulting in multi-layered application, with farmers reporting that yields are perceived as impossible without chemical inputs.

Pesticides are often viewed as a shortcut, reinforced by mainstream media promotion. Environmental impacts include soil degradation, declining populations of edible insects and bees, loss of certain bird species, and drying of wetlands.

Farmers describe the land as dead, dry, and unproductive, and link these changes to pesticide use. Health risks reported include skin irritation, dizziness, headaches, acute pesticide poisoning, and concerns about rising cancer cases.

The study underscores the urgent need for awareness-raising and the promotion of safer agroecological alternatives to mitigate the adverse impacts of highly hazardous pesticides on smallholder farming communities.

SOCIO-ECOLOGICAL DIMENSIONS OF PEST MANAGEMENT PRACTICES AMONG SMALLHOLDER TOMATO FARMERS OF NORTHERN UGANDA.

Speaker: Leo Okoyo, University of Nairobi

ABSTRACT

This study, conducted in Nwoya District, Northern Uganda, examines smallholder tomato farmers' pest and disease management practices, focusing on the interplay between climate, land tenure, seed selection, and chemical use. Drawing on field visits, market observations, and demonstration plots, the study highlights how hybrid seeds, monoculture, and short-term land rental pressure have intensified reliance on chemical pesticides, particularly mancozeb, for both preventive and curative purposes.

Common pests include leaf miners, thrips, and climate-sensitive pathogens such as late blight and *Phytophthora infestans*, with seasonal conditions influencing pest prevalence and pesticide application. Farmers integrate traditional and cultural practices with modern chemical methods, often combining multiple agrochemicals in response to market pressures and yield expectations.

The findings underscore that pesticide use is shaped by multiple interconnected factors - seed type, soil health, climate, land tenure, and market demands - rather than pest control alone. The study calls for holistic strategies that address environmental, socio-economic, and agronomic dimensions to reduce dependency on hazardous pesticides.

PESTICIDES AS INSTRUMENTS OF (UN)CERTAINTY AMONG FARMERS IN MERU DISTRICT, ARUSHA, TANZANIA

Speaker: Antonio Mosetti, Sapienza University, Rome

ABSTRACT

This study examines small-scale tomato farmers in Meru District, northern Tanzania, focusing on pesticide use as instruments of uncertainty and economic risk management.

Drawing on ethnographic fieldwork, the research highlights how farmers' decisions are shaped by hybrid seed adoption, intensive cultivation of "fast crops" like tomatoes, and the pressures of market timing. Farmers are highly aware of the health risks associated with pesticides - such as skin rashes, headaches, and fevers - yet continue their use to protect investments and ensure marketable yields.

Pesticide practices are closely linked to seed type, crop vulnerability, and industrial agricultural frameworks promoted by both government and private actors. The findings reveal nuanced local knowledge of pest management, seed selection, and environmental impacts, illustrating how individual practices are embedded within broader industrial and policy frameworks.

Farmers' knowledge of pest management and environmental impacts highlights the need for policies and support systems that are grounded in local realities, enabling safer, more sustainable agricultural practices.

THE SICK ORGANIC? A PREVIEW OF FARMER VULNERABILITIES AND RESILIENCE WITHIN THE (IN)ORGANIC PESTICIDE INDUSTRY IN TANZANIA

Speaker: Edwin Ondiege, Ghent University

ABSTRACT

This study examines the vulnerabilities and resilience of smallholder farmers within Tanzania's organic pyrethrum sector, drawing on ten months of ethnographic fieldwork across northern and southern regions, with a primary focus on agro-pastoralist communities in Arusha.

Pyrethrum, introduced during colonial times and valued as a source of natural pyrethrin for organic pesticides, is a key cash crop yet increasingly affected by pests and diseases. Farmers report that while pyrethrum is promoted as "organic" and resilient, they lack approved local interventions when crops are affected by pests, creating confusion and reliance on improvised chemical treatments.

Findings reveal that pyrethrum production is oriented toward export markets, with limited social or economic attachment for local farmers. The crop is often perceived as "elite," with knowledge and value creation concentrated among global actors, while farmers remain peripheral despite their central role in cultivation. This disconnect highlights challenges in scaling organic practices locally and in integrating organic alternatives into farming, even as synthetic pesticide use rises.

The study underscores the paradox of global demand for organic inputs alongside the local constraints preventing farmer adoption and commercialisation of organic pesticides. Policy and development interventions must address knowledge gaps, institutional support, and local capacity-building to enable farmers to benefit from organic production while mitigating reliance on hazardous agrochemicals.

THE AFTERLIFE OF PESTICIDE-ASSOCIATED WASTE: PRACTICES, PERCEPTIONS AND CONSEQUENCES AMONG SMALL-SCALE FARMERS IN KILOSA DISTRICT, TANZANIA

Speaker: Tausi Feruzi, Maseno University

ABSTRACT

This study examines the generation, handling, and impacts of pesticide-associated waste, including empty containers, used protective gear, rinse water, and contaminated soil or equipment. While pesticide use for yield improvement is widely discussed, this research focuses on the downstream waste produced and its environmental and health consequences.

Using a mixed-methods approach, data was collected from over 385 smallholder farmers, complemented by interviews with pesticide retailers and agricultural extension officers, as well as observations of farmer practices. Findings reveal low formal training (only 26 farmers) and strong reliance on peer advice for pesticide handling, with limited adherence to instructions on the label. Personal protective equipment is rarely used due to its cost, and perceptions of waste are culturally mediated, with empty containers sometimes repurposed or displayed as warnings of pesticide application on farms.

Farmers report significant health and environmental risks, including skin lesions, exposure-related illnesses, and pollution of soil and water, yet risk perception is uneven. Gender dynamics influence exposure, as women often handle storage and cleaning at home. Economic pressures, cultural norms, and weak regulation shape pesticide-associated waste management, and emerging practices, such as scrap collection of containers, are reshaping disposal patterns.

The study underscores the need to strengthen extension services, promote recycling systems, and implement community-based awareness campaigns. Critically, interventions must integrate farmers' lived experiences and perspectives to effectively mitigate the risks associated with pesticide-associated waste.

STAKEHOLDERS OF REVOLUTIONARY AGRICULTURE: WHEN ALTERNATIVE FARMING CONTRADICTS SUSTAINABLE AND ECO-FRIENDLY PRACTICES

Speaker: Lulu Tessua, University of Nairobi

ABSTRACT

This study examines the adoption of alternative farming practices among rice farmers in Ndungu village, focusing on the tension between sustainability and stakeholder-driven agricultural interventions. Farmers in the area have relied on pesticides for nearly 40 years, resulting in health risks and soil degradation.

Motivated to reduce dependence on agrochemicals, they are exploring alternative crops and farming systems. The research identifies three main alternatives: cotton, promoted by government-linked stakeholders with incentives such as subsidised pesticides and guaranteed markets; Ngwasha, a drought- and pest-resilient monocrop with potential vulnerability to crop failure; and diversified organic farming, exemplified by Mshangama's farm, which integrates multiple crops, emphasises soil and plant health, and highlights the need for ongoing education in sustainable practices.

Findings indicate that not all alternatives suggested or adopted align with the principles of sustainability or agroecological resilience. While stakeholder interventions provide economic incentives, farmers' decision-making, crop diversity, and knowledge of organic management play a critical role in determining the long-term viability and ecological impact of alternative practices.

The study underscores the importance of aligning policy support, farmer knowledge, and local agroecological contexts to promote truly sustainable and safe farming alternatives.

SESSION SIX: ALTERNATIVE FARMING PRACTICES AND PRODUCTS

Chair: Jeff Kahuho, Senior Programme Officer, PELUM Kenya

SESSION OVERVIEW

The session on alternative farming practices was conducted in two parts. In the first part, various organisations presented their approaches, initiatives, practices, and products in promoting agroecology, highlighting both barriers and enablers in transitioning from conventional to alternative farming.

Knowledge resources on achieving food production without toxic pesticides were also shared, including publications detailing HHPs, their usage statistics, impacts, and guidance on safer alternatives. Key takeaways from the session are outlined below.

Speakers

- Esther Bett, Executive Director, Resource Oriented Development Initiative (RODI Kenya)
- Lawrence Gitonga, Programme Manager, Organic Agriculture Centre of Kenya (OACK)
- Collins Othieno, Executive Director, Community Rehabilitation and Environmental Protection Programme (CREPP)
- Sylvia Kuria, Organic Farmer and Entrepreneur, Sylvia's Basket

KEY TAKEAWAYS

- **Farmer-led agroecology works**
  The three organisations empower small-scale farmers to produce their own bio-inputs using locally available materials and to use indigenous seeds, reducing dependence on chemical inputs while improving soil, environmental, and human health.
- **Low-cost, accessible alternatives exist**
  Farmers can manage pests and diseases using readily available resources, such as ash brews, plant teas, and fermented extracts, and phase out the reliance on HHPs.
- **Certification is essential but restrictive**
  While KEBS certification is critical for scaling adoption and market access, organic products face costly and prolonged approval processes compared to chemical inputs from multinational corporations, highlighting structural barriers that limit the scaling of agroecological alternatives despite strong field-level evidence of their effectiveness.
- Despite regulatory challenges, registering biopesticides as biofoliars allows organic inputs to reach farmers, demonstrating that agroecology can scale within existing systems, albeit with significant effort.
- Healthy food production is grounded in soil health rather than chemical inputs.
- Lack of qualified personnel in agrovet shops exposes farmers to unsafe advice, resulting in hazardous practices such as mixing multiple chemical pesticides. Hence, the recommendations for the establishment of a structured regulatory system to ensure that only trained and qualified personnel advise farmers and sell agrochemicals in agrovet shops, similar to the standards governing pharmacies.
- Accessible, farmer-friendly knowledge products - such as the Farmer's Resource Guide - are critical enablers of transition, empowering farmers with practical information to make informed choices and move away from toxic pesticides.

RODI-KENYA – PROMOTING AGROECOLOGY FOR REHABILITATION, HEALTH, AND SUSTAINABLE FOOD SYSTEMS

Speaker: Esther Bett, Executive Director, Resource Oriented Development Initiative (RODI-Kenya)

ORGANISATION OVERVIEW

RODI-Kenya is a 35-year-old non-governmental organisation working in prisoner rehabilitation, social justice, and legal advocacy. Agroecology is central to its rehabilitation approach and is implemented in 30 prisons in Kenya, including Kodiaga and Kibos prisons in Kisumu County, as well as at Kibos Farm Prison. RODI also extends agroecological training to refugee communities in Kakuma.

Beyond correctional facilities, the organisation works with approximately 35 schools around the prisons, integrating restorative justice and agroecology. An agroecologist is assigned to each school and works with children, parents, and teachers to promote agroecological awareness and practice.

KEY INITIATIVES AND PRACTICES

RODI-Kenya undertakes large-scale tree growing and food forest development, raising approximately one million seedlings annually in Machakos, Kiambu, and Nyeri counties. These initiatives support soil regeneration, biodiversity restoration, and long-term ecosystem resilience.

As an advocacy organisation, RODI-Kenya actively engages in national policy processes to promote safe and sustainable agriculture. The organisation was among those that petitioned Parliament to remove toxic pesticides, initially engaging the Agriculture Committee and later the Health Committee.

Through this engagement, RODI-Kenya helped highlight the link between hazardous pesticide exposure and the rising burden of non-communicable diseases in Kenya. The organisation also serves as a Safe and Healthy Food Centre for the Alliance for Food Sovereignty in Africa (AFSA), contributing to continental advocacy on safe and healthy food systems.

RODI-Kenya trains farmers and communities in the production and use of biofertilisers, emphasising that agroecological transformation begins with a shift in attitudes and

perceptions. While adoption may be challenging initially, consistent use of biofertilisers restores soil health, strengthens plant resilience, and improves food quality.
The organisation stresses that healthy food production is grounded in soil health rather than chemical inputs, advocating practices such as covering and feeding the soil, slowing and sinking water, maintaining soil moisture, integrating trees with crops, and avoiding the burning of organic waste. It also strongly advocates for seed saving, noting that many hybrid and imported seeds are nutrient-poor and produce "empty" food. Indigenous seeds, by contrast, yield nutritious crops that support community health and food sovereignty.

At its Ruiru Resource Centre, RODI-Kenya trains farmers to produce and apply biofertilisers using locally available organic materials, including leaves, grass, kitchen waste, rice water, and even meat-washing water that is commonly discarded.

Most biofertilisers are fermented, creating conditions that support micronutrient development and earthworm activity, producing both liquid and solid soil inputs. Farmers are encouraged to rethink waste as a resource and to transform their farming practices from the ground up.

Forest soil, a key ingredient in bokashi biofertiliser, represents the highest level of agroecology. When incorporated into bokashi, it multiplies during fermentation and enriches farm soils upon application. Over three to four years, soils become increasingly self-sustaining, reducing the need for repeated inputs while maintaining productivity.

The organisation also promotes food forests and companion planting, emphasising that monoculture farming is incompatible with agroecology, while crop diversity enhances soil health and ecosystem stability.

CHALLENGES

Key challenges include funding and competition from multinational corporations. The cost of product registration is high and can exceed seven million shillings. Obtaining certification from KEBS remains difficult, as locally produced inputs - such as RODI's Kilimo Hai-certified products—are often perceived as competing with commercial agrovet products.

Another major challenge is the lack of qualified personnel in agrovet shops. Many farmers rely on advice from untrained staff, leading to dangerous practices such as mixing multiple chemicals in one sprayer, resulting in highly toxic combinations that harm human

health and degrade soil fertility. Additionally, adopting agroecological practices requires sustained behaviour change and long-term commitment, which some farmers initially perceive as demanding.

RECOMMENDATION

RODI calls for the establishment of a structured regulatory system to ensure that only trained and qualified personnel advise farmers and sell agrochemicals in agrovet shops.

OACK - CULTIVATING AGROECOLOGY THROUGH TRAINING AND BIO-INPUTS

Speaker: Lawrence Gitonga, Programme Manager, Organic Agriculture Centre of Kenya (OACK)

The Organic Agriculture Centre of Kenya (OACK) actively promotes agroecology through the training of small-scale farmers and the provision of bio-inputs. Based in Murang'a County and working in Nyandarua, Embu, Kirinyaga, and Kiambu counties, OACK advances safe and sustainable farming by enabling farmers to produce biological inputs using locally available materials.

The focus is on bio-inputs that are safe for farmers, the environment, and the soil. One of their fertilisers, for example, is made from plants such as tithonia, lantana camara, and marigold, organic ingredients. Through controlled fermentation, these inputs transition from simple pest control solutions to nutrient-rich biofertilisers containing micronutrients and beneficial microbes.

Farmers are supported with over 25 fertiliser options that they can make on their farms, including ash brews for aphids, nettle and plant teas as nitrogen and potassium sources, and fermented plant extracts that act as both repellents and nutrients.

Biodiversity is central to OACK's approach. Farmers are encouraged to grow at least 12 edible crops per farm to restore ecological balance, suppress pests naturally, and enhance soil vitality. The organisation promotes beneficial insects and predators such as ladybirds and chameleons while discouraging practices that harm pollinators. OACK also supports non-chemical disease control, highlighting accessible alternatives - such as using milk as a fungicide - already available on farms.

Beyond practice, OACK contributes to policy development, having partnered with PELUM to support the Murang'a Agroecology Policy and the Riparian and Invasive Species Policy. The organisation is also pioneering innovative health–food linkages through initiatives such as the Food Pharmacy in Murang'a, where communities are referred to herbal and food-based remedies as part of preventive healthcare.

To scale adoption, OACK prioritises product certification, ensuring compliance with Kenya Bureau of Standards (KEBS) requirements, as most users in Kenya look for this certification. The organisation's primary goal is to encourage more people to adopt agroecology, hence the focus on KEBS certification to reach a wider audience.

In addition, OACK bio-inputs are Kilimo Hai certified. However, certification remains a major challenge. Approval of organic products through KEBS is lengthy and demanding in a market dominated by products from multinational companies.

Bio-pesticides are not formally recognised as pesticides by KEBS and are therefore registered as bio-foliar products, despite their proven pest-control function. Securing approval from other regulators such as KEPHIS and PCPB is more difficult, with authorities requiring extensive and prolonged trials - sometimes up to 10-15 years - despite strong evidence from field trials. This contrasts sharply with chemical products, some of which receive approval in under a year. Nonetheless, KEBS certification remains achievable when products are appropriately classified, enabling them to reach farmers despite regulatory constraints.

Overall, OACK demonstrates how agroecology can be advanced through sustainable farming practices, use of bio-inputs, and supportive policy engagement - while also highlighting the structural barriers that must be addressed to enable wider adoption.

CREPP: AGROECOLOGY - A PRACTICAL AND PROVEN PATHWAY TO RESILIENCE.

Speaker: Collins Othieno, Executive Director, Community Rehabilitation and Environmental Protection Programme (CREPP)

The Community Rehabilitation and Environmental Protection Programme (CREPP) was established in the early 1990s in response to ethnic conflict during the transition to multiparty politics, with rehabilitation at the heart of its mission. CREPP focuses on climate change adaptation, farmer training, and agroecology as a practical and proven pathway to resilience.

It promotes agroecology as both a climate adaptation strategy and a sustainable farming system, grounding its work in the understanding that agroecology is not new but rooted in long-standing local knowledge. Its approach emphasises the three dimensions of agroecology - science, practice, and movement - supporting farmers to apply scientific principles through practical, field-based methods while building broader social support for agroecological transitions.

The organisation uses community groups and schools as key entry points. CREPP turns learning institutions into living agroecology demonstration sites that influence parents, students, and teachers. Parents living near the schools are actively engaged, enabling agroecological practices to spread from schools to the communities.

Beyond implementation, CREPP systematically documents its training, practices, and outcomes to generate evidence for influencing policy, particularly at the county level. Through national networks such as PELUM Kenya and Scope Kenya, CREPP contributes to national advocacy on sustainable agriculture.

CREPP also strengthens civil society by building farmer and CSO capacity and fostering networks that enable farmers to act as peer educators and advocates. Farmers are supported to engage in public participation processes, including county planning and budgeting, to secure investment in agroecology.

This approach has delivered tangible results, notably in Homa Bay County, where CREPP helped influence a shift from chemical fertiliser distribution to indigenous seeds. Seed conservation remains central to CREPP's work, with farmers encouraged to preserve, share, and bank indigenous seeds to enhance biodiversity and climate resilience.

THE FARMERS' RESOURCE GUIDE: ACHIEVING FOOD PRODUCTION WITHOUT TOXIC PESTICIDES

Speaker: Sylvia Kuria, Organic Farmer & Entrepreneur, Sylvia's Basket

Through the Heinrich Böll Foundation (HBS), the Route to Food Initiative, Ecotrac Consulting, and many partners, we set out to ensure that efforts to achieve food production without toxic pesticides are documented and widely shared. The journey began in 2019 with The Food Challenge, a three-part documentary that questioned the necessity of chemicals for food security while showcasing sustainable alternatives. I had never seen such data or analysis before, and this was my first real encounter with pesticide issues in Kenya. Although COVID-19 curtailed its launch in 2020, it laid the foundation for deeper engagement.

This was followed by a scientific assessment of pesticides in the Kenyan market, led by Ecotrac Consulting in close collaboration with RODI-Kenya and BIBA. In 2022, HBS globally released the Pesticide Atlas, which we launched in Kenya with strong African perspectives, alongside the Soil Atlas.

In 2023, we published the Toxic Business report. With each publication, we intentionally made the information more accessible - simpler language, clearer visuals, and practical relevance. However, when we shared Toxic Business with farmers, many struggled to interpret the scientific graphs and relate the findings to their daily realities. That gap inspired the next step: a Farmer's Resource Guide. Working with the Route to Food Initiative, Ecotrac Consulting, and a group of 20 farmers and civil society partners, we co-developed a simple, pictorial A5 guide that any farmer can easily understand.

What excites me most is its practicality. Using images, the guide shows farmers how to identify active ingredients on pesticide labels and explains the health and environmental risks associated with each. This enables farmers to make informed choices at the agrovet. If a true revolution is to begin from the ground up, farmers must have the knowledge to make decisions.

This guide is a call to action - for farmers to transition to safer inputs, for students to share and simplify knowledge, for academia to integrate it into curricula, for researchers to bridge science and practice, and for entrepreneurs to support informed, toxin-free food systems. Together, we can grow food without applying highly hazardous pesticides.