UFZ-Workshop “Towards policy-relevant research on pesticides”

Report of Contributions

https://events.hifis.net/e/1632

Contribution ID: **23** Type: **not specified**

Keynote I: Unsolved Problems in the Assessment and Management of Environmental Risks of Pesticides – Research Tasks not only for the Natural Sciences

Wednesday 23 October 2024 09:00 (45 minutes)

EU law defines pesticides as the entirety of biocides and plant protection products. Both groups of substances must undergo a complex environmental risk assessment in authorisation procedures in order to be marketed and used. Despite these requirements, according to current knowledge plant protection products in particular have a serious impact on biodiversity in agricultural ecosystems and also pollute groundwater. The search for causes leads to interesting research questions. These are only partly in the field of natural sciences. Rather, the bottleneck for the necessary reform of environmental risk assessment and environmental risk management are often political and economic problems that are, however, cloaked in scientific terms. Against this backdrop, the presentation shows starting points for the possible further development of the scientific work of the Helmholtz Centre for Environmental Research.

Presenter: WOGRAM, Jörg (Umweltbundesamt)

Contribution ID: **24** Type: **not specified**

Keynote II: Sustainable crop production: managing the needs of productivity, environmental safety and agronomic reality

Wednesday 23 October 2024 09:45 (45 minutes)

Synthetic chemical and biological plant protection products (PPPs) are used in crop production to control pests and weeds, thereby ensuring yield and crop quality. In the absence of PPPs, approximately one-third of global crop yield would be lost (EPRS, 2019). In years with extreme weather conditions, not using synthetic chemical PPPs can lead to total crop loss, as seen in organic potato cultivation in Germany this year. In addition, farmers face stringent quality standards imposed by food trade organizations, especially when marketing fruits and vegetables. Defects resulting from fungal or pest infestation are deemed unacceptable and therefore non-marketable, even if the produce is still fit for human consumption. In Germany alone, the utilisation of modern PPPs is estimated to generate an economic value between one and four billion euros annually (von Witzke & Noleppa, 2013).

However, due to the potential risks associated with PPPs, the use of plant protection products is subject to a wide range of regulatory requirements. The regulatory system for assessing PPPs and their active ingredients have developed continuously in recent decades, particularly in Europe. EU PPP legislation is considered to be the strictest in the world (EC, n.d.). In addition, PPPs may only be used under the principles of Integrated Pest Management (IPM): All preventive measures should be taken before PPPs are used, in order to limit their use to the necessary minimum level. The stringent demands for health and environmental protection, coupled with the high costs of research and development for new PPPs active substances, have resulted in more substances losing their authorization than new substances gaining approval. In 1993, agriculture had access to approximately 700 chemical active substances; today, only about 200 remain, marking a decrease of over 70 %. There has also been a reduction in the availability of biological PPPs, hence biological PPPs will not be able to cover the gaps from lost chemical PPPs in the near future. Treatment gaps in key agricultural crops are worsening despite major investments in the sector (€10
billion in precision application and digitalisation and €4 billion in biopesticides by 2030 planned by the European crop protection industry, Innovation & Investment - CropLife Europe). This bottleneck is already evident in widespread crops, with only a few insecticides remaining for potato, rapeseed and fruit cultivation. While Germany maintains a self-sufficiency rate of approximately 100% for cereals,
this figure drops to 22% for fruits and vegetables. If PPPs were no longer used, the average degree of self-sufficiency in Germany would be approximately 50% (Noleppa, 2017). Furthermore, the emergence of new pathogens or invasive species is facilitated by climate change. New problems may emerge within a few years, leading to significant yield losses. For example, the “Syndrome Basses Richesses” (SBR) in sugar beet and potato, a bacterial disease transmitted by a
planthopper, has the potential to cause substantial economic damage. The ongoing loss of chemical active substances thus gives rise to considerable economic disadvantages for farmers and consumers alike. The necessity to import crops from other regions of the world, where environmental and operator exposure safety standards are often lower, results from yield losses in Germany. Furthermore, declining harvests give rise to alterations in land use, including the conversion of natural areas into agricultural land in other regions. This process has the potential to result in the loss of biodiversity hotspots and the release of considerable amounts of greenhouse gases through defor-

estation and humus depletion. So, the question to be asked is: What level of risk can we accept from the use of PPPs? And how can we reduce the risks of pesticide use without reducing crop yield? What do we suggest?

A positive example of a solution to the competing goals of plant protection in agriculture and the protection of natural resources is the is the cooperation between drinking water providers and PPP manufacturers ("Round Table"). The key elements are the regular sharing of information, joint problem-solving in relation to pesticides and drinking water resources, and the operation of a database on the presence of plant protection products (PPP) in raw water resources. This exchange format has facilitated the overcoming of prejudices, the attainment of mutual understanding of the constraints and motivations of the other party, and the development of targeted solutions. The format could also be transferred to other areas with a view to jointly clarifying causes and finding solutions, for example, the interpretation of data from small water body monitoring. An additional solution to maintaining yields while reducing risks is the implementation of novel digital and precision application techniques, including partial area spraying, spot applications, and individual plant spraying. The widespread application of modern technology in agriculture has the potential to reduce the use of PPPs by an average of 25% (HFFA, 2022). The potential reduction in risk for specific

compartments (e.g. water bodies) is considerable. This is an area that requires further investigation, as there is currently a lack of data concerning the potential risks associated with the utilisation of novel digital and precision application techniques, including partial area, spot and individual plant applications. It is imperative that research and data generation be conducted on these methods and

their potential for site-specific risk reduction. The objective is to identify the optimal risk reduction strategy for a given location, comprising a combination of the most suitable measures, and to quantify their impact.

It is of great importance to conduct research into the effects of pesticides in the environment. In order to better characterise the environmental effects, data is required. When evaluating pesticide findings from monitoring programmes, it is essential to consider the relevance of these findings for the risk assessment and the overall risk context. The consequences for food production of not using chemically synthesised PPP are significant. Therefore, research is necessary to find solutions that enable the use of pesticides while simultaneously fulfilling the high environmental protection goals.

Presenters: WINTER, Mark (Industrieverband Agrar); MÜLLER, Jörg

Contribution ID: **25** Type: **not specified**

Lecture I: Steuer und Abgaben auf Pestizide - Möglichkeiten und Chancen

10 min + 5 min discussion

Pflanzenschutz ist auf vielfältige Weise möglich: mit vorsorgender und angepasster Bewirtschaftung sowie mit mechanischen, biologischen oder chemischen Maßnahmen zur Minimierung von Schaderregern. Chemische Pflanzenschutzmittel werden von den Herstellern als der einfachste und günstigste Weg beworben. Ihre Wirkstoffe (Pestizide) haben allerdings auch die weitreichendsten Auswirkungen für die Umwelt, da sie regelmäßig zugleich auf Nicht-Zielorganismen auf den Flächen und in den Böden einwirken sowie durch Wind und Wasser auf andere Flächen und in Gewässer verfrachtet werden. Des Weiteren gehen von ihnen Risiken für die Gesundheit der Anwender und Anwohner sowie aufgrund der Rückstände auch für die Konsumenten behandelter Agrarprodukte aus. Ein nachhaltiger, d.h. dauerhaft umwelt- und gesundheitsgerechter Pflanzenschutz ist daher nur mit einer weitgehenden Minimierung des Pestizideinsatzes zu erreichen. Entsprechende Ziele bestehen auf europäischer und nationaler Ebene schon lange. Die Mitgliedstaaten der Europäischen Union haben sich verpflichtet, spätestens ab 2014 nur noch einen integrierten Pflanzenschutz zu erlauben, der nicht-chemischen Maßnahmen Vorrang einräumt (Art. 55 Verordnung 1107/2009/EG und Art. 14 Richtlinie 2009/128/EG).

Möckel, S., Gawel, E., Liess, M., Neumeister, L. (2021b), Wirkung verschiedener Abgabenkonzepte zur Reduktion des Pestizideinsatzes in Deutschland –eine Simulationsanalyse, https://www.gls.de/media/PDF/Presse/Studie_Abgabe_in_Deutschland_2021.pdf and www.ufz.de/index.php?de=36458, GLS Bank, 136 S.

Möckel, S., Gawel, E., Liess, M., Neumeister, L. (2021a), Pesticide tax in the EU - Various levy concepts and their impact on pesticide reduction, https://www.gls.de/media/PDF/Broschueren/GLS_Bank/Studien/Study_Pestic Taxes__2021_.pdf and https://www.ufz.de/index.php?en=36458, GLS Bank, 115 S.

Presenter: MÖCKEL, Stefan

Contribution ID: **26** Type: **not specified**

Lecture I: Pesticides in the landscape - lessons from insect pollinators and remote sensing

Wednesday 23 October 2024 11:00 (15 minutes)

10 min + 5 min discussion

Presenters: GROENEVELD, Juergen; WICK, Lukas Y.; UKSA, Marie; VON BERGEN, Martin

Contribution ID: **27** Type: **not specified**

Pitch Presentations

Wednesday 23 October 2024 11:30 (30 minutes)

1) Olaf Buettner - Seamless forward assessment of toxic risks in river networks for mixtures of chemicals originating from wastewater treatment plant effluents
2) Jonas Groening - Partitioning and ecotoxicological effects of pyrethroid insecticides in German small streams
3) Leonia Martha Schweiger & Marco Foit - An open, digital platform for the spatial visualization of predicted pesticide concentrations and their effects
4) Alina Kindinger - A novel Land Use Intensity Index for Streams (LUIS) for the prediction of agriculture impacts of nutrients and pesticides on ecosystem functioning
5) Yiqing Zhang - Meter-Scale Spatial Heterogeneity Shapes Residual Pesticide Concentrations and Potential Risk in an Agricultural Field
6) Mechthild Schmitt-Jansen - To shift or not to shift: the role of pesticides in regime shifts of shallow aquatic systems under climate warming
7) Thomas Reitz - Effects of herbicides on structure and functioning on fthe soil microbiome
8) Victor Alfonso Castaneda-Monsalve & Nico Jehmlich - tba
9) Tobias Polte - Maternal exposure of mice to glyphosate induces depression- and anxiety-like behavior in the offspring via alterations of the gut-brain axis
10) Gunda Herberth - Pesticides' effects on human health and immune system
11) Sebastian Canzler - Harvesting public omics data: a novel appraoch for chemical grouping
12) Till Luckenbach - The amphipod Gammarus pulex thrives in polluted habitats but genetic diversity is affected
13) Stefan Scholz - Assessment of Pesticides using a zebrafish high content screening approach
14) Nadia Katherine Herold - Multi-behavioral fingerprints in larval zebrafish can identify the mode of action for neuroactive pesticides

Presenter: BÜTTNER, Olaf

Contribution ID: **28** Type: **not specified**

Lecture II: Political Life of Pesticides

Wednesday 23 October 2024 11:15 (15 minutes)

10 min + 5 min discussion

Four years of householdfunded political science research were conducted at UPOL using qualitative social science methods. Main findings are published in 2022 in Environmental Science and Policy (abstract below). Your workshop could be an opportunity to recap other results we have on the desk. Here is the abstract of the journal article (also presented at DVPW in September): Why is hazardous pesticide pollution of water bodies in the EU not effectively limited by state regulation? Using the conceptual framework of unsustainable lock-ins by Karen Seto et al., we show that there are various "pesticide lock-ins"in Europe. We draw on semi-standardized interviews with decision-makers in the field of pesticide politics to formulate six lock-ins that describe how state actors fail to tackle this global environmental challenge. We outline infrastructural, institutional and behavioural lock-ins that are self-stabilizing and can be moved only through tremendous resources, time, or extraordinary windows of opportunity

Presenter: HÜSKER, Frank

Contribution ID: **29** Type: **not specified**

Lecture III: Fiction, Reality and the Way Forward in Pesticide Risk Assessment

Wednesday 23 October 2024 13:00 (15 minutes)

10 min + 5 min discussion

The global decline in biodiversity is due to a variety of anthropogenic stressors. Amoungst these, pesticides play a decisive role. In response to this, ever higher targets are being proclaimed in environmental legislation, such as the EU's Green Deal. However, some of these targets are scientifically contradictory. For example, reducing use by 50% and reducing risk by 50% are incompatible, given that toxicants generally exhibit logarithmic effects. In addition, there are a number of fundamental shortcomings in the current regulatory risk assessment process. This includes the inadequate design and evaluation of higher tier tests, the failure of ecotoxicological models to consider relevant factors such as latent effects, culmination and synergistic interactions of stressors. And finally the lack of validation of predictions at the ecosystem level. I suggest a parsimonious and realistic framework for the prospective effect assessment of pesticides.

Presenter: LIESS, Matthias

Contribution ID: **30** Type: **not specified**

World Café with coffee

Wednesday 23 October 2024 13:15 (1h 30m)