# Systemic pesticides and the biodiversity crisis: Toxic practices in agriculture, aquaculture and policy making

**7 June 2022, Grand Hotel Terminus, Bergen**

(room open 9:30) 10:00

**Welcome address**
Jeroen van der Sluijs (Centre for the Study of the Sciences and the Humanities, University of Bergen)

10:05
**Opening statement**
Maarten Bijleveld van Lexmond (Chairman of TFSP, IUCN's International Task Force Systemic Pesticides)

**Session 1: Impacts on terrestrial biodiversity and ecosystem services**

10:15
**The worldwide integrated assessment on systemic pesticides: the emblematic case of neonicotinoids**
Jean-Marc Bonmatin (Vice chair TFSP; CNRS Center for Molecular Biophysics CBM, Orléans, France)

10:35
**Neonicotinoids and pollinators in Norwegian fruit orchards**
Bjørn Hatteland (NIBIO)

10:55
**Impacts of neonicotinoids on soil biodiversity and aquatic organisms**
Alex Aebi (MER en Agroécologie, Université de Neuchâtel)

11:15
**Discussion**
11:30
**LUNCH**

**Session 2: Systemic Pesticides as contaminants of emerging concern in the marine environment**

12:30
**Silent Spring of the Sea - Salmon Pharming Kills Shellfish & Other Marine Life**
Don Staniford (SCAMON SCOTLAND/ Scottish Salmon Watch)

12:50
**Neonics in the marine environment: impacts on shellfish and fish**
Craig Downs (Executive Director The Global Coral Repository - 'A Coral Bank For Reef Restoration' / Haereticus Environmental Laboratory, Clifford USA)

13:10
**Lessons from legacy persistent organic pollutants (POPs) and endocrine disruptors (EDCs) in the aquatic environment**
Anders Goksøyr (Department of Biological Sciences, University of Bergen)

13:30
**Discussion**
13:45
**Mini Break**

**Session 3: Human and policy dimensions**

13:50
**Available solutions for a pollinator-friendly agriculture in arable crops**
Lorenzo Furlan (Chairman TFSP Working group on Alternatives)

14:20
**The war on the EFSA's 2013 bee guidance – why is it still not into force?**
Vincent Harmsen (Investigative Journalist, Zembla, Netherlands)

14:30
**Pesticides and decision-making: public vs. economic interests**
Noa Simon Delso (BeeLife)

14:50
**Discussion**
15:05
**Tea break**

**Closing session**

15:15
**The systemic pesticide catastrophe: Bridging the gaps between knowledge and action**
Jeroen van der Sluijs (Centre for the Study of the Sciences and the Humanities, UiB)

15:35
**Panel discussion**
16:00 *End.*

**Jean Marc Bonmatin**

JM Bonmatin's work is at the interface of chemistry, biology and toxicology. He focuses on 1) pesticide exposures, and 2) mechanisms of action and effects on living systems. This leads to fine-grained risk assessments for biodiversity and health.
Vice-president of the TFSP (www.tfsp.info), JM Bonmatin is a member of national expert committees (Agency for Food Safety and the Environment, Institute of Bees and Pollination, Ministry of Agriculture), as well as international organizations (IUCN, OECD). Today, he works more and more on public health aspects.

**The worldwide integrated assessment on systemic pesticides: the emblematic case of neonicotinoïds**

The Task Force on Systemic Pesticides (TFSP) is a global group of independent researchers. The TFSP has published numerous articles constituting the Worldwide Integrated Assessment on Systemic Pesticides in 2015 and its update in 2020.
These articles describe the widespread contamination of the environment by neonicotinoids (air, soil, water). They also describe the numerous impacts, not only on terrestrial and aquatic invertebrates, but also on vertebrates such as fish and birds. There is increasing evidence of effects on human health via contaminated food.
However, alternatives to neonicotinoids exist. They are effective and ready-to-use but are slow to be implemented due to resistance from stakeholders and commercial interests.
Only the partial ban of some neonicotinoids in Europe has allowed to decrease the pressure of these insecticides on the environment, biodiversity and our health.

The book entitled "Systemic Pesticides" co-edited by JM Bonmatin received a first scientific award in the Philippines in 2018. Another book entitled "Bees: an intimate story with humanity" has just received the first prize of the scientific book of high school students in France.

**Don Staniford**

Don Staniford is an award-winning environmental campaigner. He has campaigned for over twenty years against the expansion of salmon farms all over the world - for Friends of the Earth Scotland, Friends of Clayoquot Sound in Canada, the Green Warriors of Norway and now for $camon $cotland. He is author of 'Silent Spring of the Sea' and can be seen in Netflix's 'Seaspiracy'.

**Silent Spring of the Sea - Salmon Pharming Kills Shellfish & Other Marine Life**

Sixty years ago Rachel Carson warned about a ‘Silent Spring’. Now the chemical warfare in modern agriculture has moved into coastal waters with a war on sea lice precipitating a ‘Silent Spring of the Sea’ via aquaculture. Salmon pharming is dependent upon a cocktail of lethal chemicals such as Azamethiphos, Deltamethrin, Emamectin benzoate, Hydrogen Peroxide and now the banned neonicotinoid Imidacloprid is being deployed in Norway. Campaigners, politicians, scientists and veterinarians have united to oppose the use of Imidacloprid use on salmon farms in Scotland. You do not need to be a rocket scientist to understand that chemicals labeled as ‘marine pollutants’ pollute the marine environment or understand that chemicals labeled as ‘toxic to shellfish’ kill shellfish such as lobsters. Data from Scotland and Norway shows that chemically embalmed salmon is being falsely marketed as ‘environmentally friendly’ and ‘responsibly sourced’. Just say no to drugs – don’t eat pharmed salmon.

***Lorenzo Furlan,***
**Veneto Agricoltura, Legnaro (PD)**

Lorenzo Furlan graduated in Agricultural Sciences at the University of Padua, Italy, in 1984. He was awarded Italy's National Scientific Qualification to teach Plant Pathology and Entomology as a Full Professor in 2017. Today, he manages the Arable Crops and Livestocks Research Department at Veneto Agricoltura. TFSP member in charge of the alternatives to systemic pesticides assessment. A significant part of his research is devoted to Integrated Pest Management (IPM) in arable crops, with special focus on wireworms and WCR, and to sustainable agriculture. He has taken part in 11 European research projects as Coordinator or WP/Task Leader. He has also authored/co-authored more than 300 papers, including 67 WOS/Scopus articles (H-index: 22). His papers in the sector of Agriculture, Fisheries, & Forestry, sub-sector Entomology, rank him in the top 2% of the world's scientists, according to "Updated science-wide author databases of standardized citation indicators field"

**Available Solutions for a Pollinator-friendly Agriculture in Arable Crops**

Many factors interact continuously in agricultural ecosystems. The choices about farm structure and the cultivation practices are the drivers of an ecosystem balance more or less suitable for pollinator health and productivity. Structural choices: planning of uncultivated areas such as borders and hedges (plant species with different potential for hives production and flowering periods), structural or flexible rotations including crops such as canola or sunflower play a key role. Cultivation practices based on Integrated Pest Management (IPM) implemented by putting in place prevention practices (including the structural choices) and by using holistic models and monitoring are the other pillar for creating suitable conditions for pollinators. Structural choices combined with sustainable cultivation in a holistic approach become "cultivation packages" that may produce good rewarding agricultural products without using any chemical insecticide. Results of long-term implementation of these sustainable "cultivation packages" backed by a novel insurance method against crop failure will be presented.

**Noa Simón Delso**

Noa Simón Delso became Scientific Director and Project Manager at BeeLife at the beginning of 2021. She holds a PhD in Agricultural Science and Bioengineering from the Université Catholique de Louvain (Belgium), an MSc in Economy, Management and Consumer Studies from Wageningen University (the Netherlands) and she is a DVM from the University of León (Spain). In her scientific career, Noa has specialised in environmental toxicology, particularly on bees, environmental policy and honey bee health, fields in which she has published several papers in peer-reviewed international journals in the field of environmental research, health and toxicology. In 2019 she started diversifying her activities, evolving towards the implementation of data science to pollinators health. In parallel, she has provided technical assistance to Belgian and European beekeepers and decision makers. Since 2009, she has provided scientific-technical assistance to the European organisation BeeLife, following the evolution and implementation of European legislation on the subject of pesticide authorisation, agricultural and environmental policy.

**Pesticides and decision making: public vs economic interests.**

**Anders Goksør**

My MSc (1984) and PhD studies (1987) in biochemistry at UiB led to fundamental insights in the cytochrome P450 system of fish and whales, which were poorly studied at the time, and gave me the Meltzer Young Researcher Award (UiB, 1989). I quickly established myself as an independent researcher with a growing research group focusing on marine environmental toxicology, biomarker development, endocrine disruption, and ocean and human health. I developed the first teaching program in toxicology and MSc program in environmental toxicology at UiB from 1993. My interests in applying biomarker technology led to the establishment of Biosense Laboratories AS in 1996, an innovative company producing biomarker assays and kits for environmental monitoring and food safety and still operating on the global market. After a period as CEO and CSO of the company, I returned to the university to continue academic research and expanding my research group with several large successful EU and national grants. During 2010-2016 I was appointed Head of Department (HoD) of BIO, which had 230 employees during this period, giving me a broad experience in academic leadership, relating both to economy, teaching development and HR aspects. Throughout my career I have always been interested in outreach and science communication, and have produced >100 popular science articles and feature stories for magazines and newspapers, numerous interviews in various media + 2 popular science books. My scientific production includes >180 scientific articles, book chapters, and reviews, and >11,000 citations on Google Scholar.

**Lessons from legacy persistent organic pollutants (POPs) and endocrine disruptors (EDCs) in the aquatic environment**

Anders Goksøyr (Department of Biological Sciences, University of Bergen)
For a century or more, humans have produced and spread chemical compounds in nature that can cause hormonal chaos in organisms and lead to strange effects such as imposed sex and other endocrine and reproductive disturbances. But the effects were only slowly and gradually becoming apparent. Phenomenas like eggshell thinning in birds imposex in neogastropod snails, male fish with roe, and alligators with small penises were observed. The links to specific chemical exposures emerged over decades of research into environmental toxicology and chemistry, demonstrating that insights into mechanisms of action of chemicals, adverse outcome pathways, and species diversity of responses, are important tools in understanding and predicting risks of chemicals.

**Alexandre Aebi**

As an associate professor at the Institutes of biology and anthropology of the University of Neuchâtel, the research activities of Alex Aebi are focused on honeybees and other environmental sentinels able to document the fate of pesticides in natural terrestrial and aquatic ecosystems. Using social sciences tools, he is interested in the involvement of scientists and beekeepers in societal and environmental issues. Finally, he uses his experience in agroecology to propose alternatives to pesticides for a sustainable agriculture.

**Impacts of neonicotinoids on soil biodiversity and aquatic organisms**

Neonicotinoids are omnipresent in terrestrial, soil and aquatic ecosystems. While their impact on honeybees was vastly documented and mobilized in a societal and political context, sound information on their impact on soil and aquatic organisms is scarce. During this talk, I will briefly review the scientific information available on these organisms and share the work done at the University of Neuchâtel, with a landscape perspective. Finally, I will discuss our experience in choosing the best sentinel species to capture the environmental fate of neonicotinoids and the risks associated with their use in an agricultural context.

**Jeroen P. van der Sluijs**

Jeroen P. van der Sluijs is professor at the Centre for the Study of the Sciences and the Humanities at the University of Bergen, Norway. Originally trained as a natural scientist (MSc in chemistry with major in theoretical ecology form Leiden University 1990, and PhD on uncertainty in climate risk assessment form Utrecht University, 1997) he developed a research interest in actionable knowledge for risk governance in a context of scientific uncertainty and controversy. Over the past 15 years he has been studying amongst other the emerging science-policy interface around pollinator decline, insect decline and insect conservation, as well as risk assessment and risk governance of neonicotinoid insecticides. He leads the case-study on bees and pesticides of the European H2020 project "REconciling sCience, Innovation and Precaution through the Engagement of Stakeholders (RECIPES)". He (co-)authored more than 100 peer reviewed publications and is in the top 2% of the most cited scientists in the world (Stanford list). He ranked regularly high in "The Sustainable 100", a list of the most influential Netherlands persons contributing to sustainable development, by daily newspaper Trouw.

**The systemic pesticide catastrophe: Bridging the gaps between knowledge and action**

In the 60 years that have passed since Rachel Carson's Silent Spring, we have been on a pesticide merry-go-round. Successive generations of pesticides are released and subsequently banned a decade or two later once the environmental harm they cause becomes evident. While pesticides are typically replaced by new ones, this new generation of chemicals often raises new and unanticipated risk concerns. The latest episode has been the systemic pesticides and especially the so-called neonicotinoids, which have become the most widely used class of insecticides in the world. As a consequence of their large-scale prophylactic use in combination with their unprecedentedly high toxicity for insects, their use has dramatically impacted pollinators, soil ecosystems and aquatic ecosystems. Based on the results of the EU-funded project “REconciling sCience, Innovation and Precaution through the Engagement of Stakeholders RECIPES), we can draw important lessons for necessary reforms of environmental risk assessment frameworks and beyond. Europe alone can however not solve the systemic pesticides catastrophe. Global instruments such as the Stockholm Convention on POPs need to be strengthened and a reform of agricultural practices towards agro-ecology is urgently needed

**Vincent Harmsen**

Vincent Harmsen works as an investigative journalist for the Dutch tv program Zembla. Before joining Zembla, Harmsen worked for Dutch Radio 1 and for the Dutch platform for investigative journalism Follow the Money. Harmsen has written extensively about EU pesticide regulations and the chemical industry, with a special focus on lobbying and public relations efforts. As a journalist he has lived and worked in Brussels and has published in international outlets such as the Guardian and EUobserver.

**The war on the EFSA’s 2013 bee guidance – why is it still not into force?**

The use of agrochemicals is an important driver of the decline of bee populations in Europe. But why are harmful pesticides still allowed to enter the European market and to be used in farming? Already in 2013 a group of scientists working for the European Food Safety Authority (EFSA) drafted a guidance document that proposed a set of new regulatory tests with the aim of identifying and banning pesticides that are toxic to bees. Although there exists broad agreement that the current regulations are failing to protect bees, this ‘bee guidance’ document has met with fierce opposition since, and has, until today, not been adopted by the EU member states.

**Craig Downs**

Dr. Craig Downs received his Ph.D. in Molecular and Cellular Biology from the John A. Burns School of Medicine, University of Hawaii. He received a M.Sc. from Syracuse University. He was president of several biotechnology corporations, and was a founding member of several more companies, ranging from diagnostic platforms and immuno-therapeutics to dermatological technologies. He has sat on the board of director on a number of environmental, non-profit charitable organizations, including as Executive Director of Haereticus Environmental Laboratory. He is currently Invited Professor at Sorbonne University.

Dr. Downs research interest range from plant physiology to cellular mechanisms for homeostasis. He worked extensively as a biochemist on the small heat-shock proteins of mitochondria and chloroplasts. He has published extensively on environmental forensics and ecotoxicology. One of his first cases was the ecological and physiological recovery of the Exxon Valdez Oil Spill, and has published a number of papers examining the ecotoxicology of crude oil and fuels on corals and other marine organisms. He has also published a number of papers on the ecotoxicology of pesticides in marine species. In industry, he developed diagnostic technologies for both human and non-human infectious agents, as well as a system array to examine cellular homeostasis in response to pharmaceuticals and pesticide toxicants.

Dr. Downs has also been able to successfully advocate for social and political change regarding a number of chemicals, ranging from neonicotinoid pesticides, herbicides, and most recently, sun cream chemicals like oxybenzone (benzophenone-3), octocrylene, camphors and octinoxate.

**Neonics in the marine environment: ecological impacts**