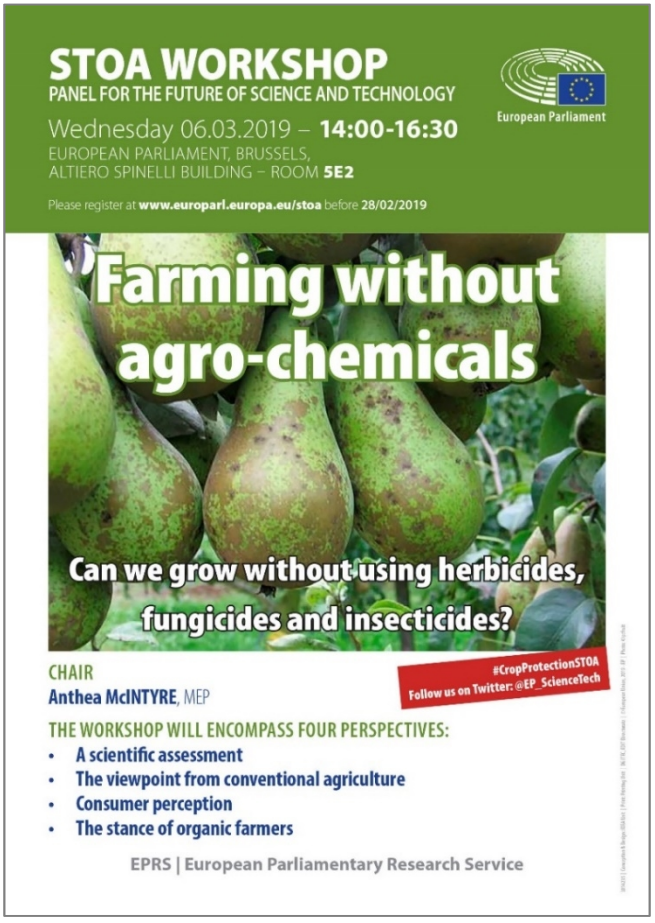
European Parliament

STOA workshop

Farming without agro-chemicals

Participants' booklet



EPRS | European Parliamentary Research Service

Scientific Foresight Unit (STOA)

PE 634.418 – 6 March 2019

EN

Farming without agro-chemicals

Can we grow without using herbicides, fungicides and insecticides?

Participants' booklet

6 March 2019, 14:00-16:30

Paul-Henri Spaak Building, Room 5E2

European Parliament, Brussels

Prepared by Lieve Van Woensel and Richelle Boone, Scientific Foresight Unit (STOA)

Available at http://www.europarl.europa.eu/stoa/en/events/farming-without-agro-chemicals

Join the conversation on Twitter by using the hashtag **#CropProtectionSTOA** and by tweeting at **@EP_ScienceTech**

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Anthea McINTYRE, MEP and STOA Panel Member

2. Agriculture without pesticides? A summary of the scientific assessment

Professors Dany BYLEMANS, Barbara DE CONINCK and Wannes KEULEMANS, Department of Biosystems, KU Leuven

Food security and healthy food for 11 billion people is one of the biggest challenges of this century. It is one of the most important, if not the most important, human right and any agricultural system has to fulfill this requirement within the planetary sustainability boundaries. This implies that no further land increase for agriculture is acceptable, since this is the key driver for biodiversity loss, greenhouse gas increase and environmental impact. According to scientific literature, there is no other option than to increase the global yield efficiency and reduce the yield gap to guarantee global food security. As such, one can ask the question if it is possible to maintain the actual yields in North-West Europe and increase yields in other regions of the world without pesticides or with reduced pesticide use. Another aspect that needs consideration is the public perception that pesticides are unhealthy and have very negative impacts on biodiversity and the environment.

Pesticides are plant protection products such as herbicides, fungicides and insecticides. Pesticides include both synthetic pesticides and 'bio-pesticides', which are used in organic agriculture. The amount of pesticides used has doubled since 1980, but the development of new conventional (synthetic) pesticides has decreased while the number of bio-pesticides has increased the last decades, partially because of legislation. The increased use of pesticides was one of the drivers of the 'green revolution', and contributed to the three-times increase of crop yields in developed countries. Looking at the EU countries, there are considerable differences in pesticide use and this correlates with differences in crop yield. The shift from broad-acting pesticides to more specific pesticides – which only target specific pests or diseases and avoid impact on non-target organisms – implies that farmers have to spray more with these specific-acting pesticides. This is one of the reasons for the recent increase of pesticide use, without the positive effect on crop yield increase of the past. Crop protection not only entails the use of (bio)pesticides but also other measures, such as crop rotation, the implementation of resistant cultivars (no or restricted availability in many crops), soil management and others.

The introduction of pesticides in the EU is under a very strict regulation and involves a long procedure, including a scientific evidence-based risk assessment. This includes an evaluation of the toxic effect on humans and on other organisms. Pesticides are today, when applied properly, much safer than in the past and there is a strict control on residues. The legal acceptable residue levels are at least 100 times lower than the toxic levels for humans, making the risk much lower than in other economic sectors. How pesticides are applied has improved considerable as well, and this contributed to lower impacts on environment and lower risks for applicators. Risk assessment costs for the crop protection industry per active substance increased from $41 million in 1995 to $71 million nowadays.

Without pesticides, yields will be reduced and reductions between 19% (wheat) and 42% (potato) have been reported. These reductions are higher in regions with high actual production, the latter also because of fertilizers, high yielding varieties, irrigation etc. Without pesticides – including bio-pesticides – food security of 11 billion people in the future is threatened. On the other hand, it is still an open question whether it is possible to reduce the use of pesticides without yield reduction. There are several indications that for specific crops, a reduction in pesticide use is feasible. The

general tendency is that a reduction seems possible in case of (very) high pesticide use, but not in the case of low use.

Pesticides still have unwanted and unavoidable side effects, such as their negative impact on biodiversity. However, this correlation is not well studied and it seems that the most important effect on biodiversity (loss) is land use change. In this respect it is clear that organic farming – and its implementation in agro-ecology – is often not the best choice. At the farm level, all scientific meta-studies indicate that the increase in biodiversity is rather marginal, but at the global level, there will be a drastic decrease in biodiversity, because organic farming is approximately 25% less productive than conventional farming. This implies that to feed 11 billion people, more land is needed at the expense of biodiversity. Also for other environmental parameters – like eutrophication and acidification – organic farming has more negative impacts than conventional farming. Moreover, the perception that organic pesticides are less toxic and lead to less residues, and the idea that organic food is more healthy are not always correct and need further scientific confirmation. The latter at least has not been confirmed in meta-studies.

Although there has already been a lot of progress in the past concerning the negative impact of pesticides on humans and the environment, considerable improvements are still possible today. Reduction of pesticide use seems one way – e.g. based on sophisticated warning systems, but such a reduction is only realistic when the risk for the farmer concerning yield or food quality decrease is acceptable. Precision farming – including improvements of equipment and the appliance of nanotechnology – can also contribute to more targeted application and reduction of pesticide use. New products are under development that enhance the natural plant defense. An important contribution will also come from the breeding of more resistant varieties, both by classical breeding and by new breeding techniques, such as precision mutation breeding by the CRISPR-Cas approach or by other genetic transformations. The latter techniques will be unavoidable to reach the United Nations' Sustainable Development Goals (SDGs) concerning food security and healthy food in the context of the planetary sustainability boundaries.

This section summarizes the in-depth analysis 'Farming without plant protection products: Can we grow without using herbicides, fungicides and insecticides?'.

3. Speakers' biographies

3.1. Anthea McINTYRE, MEP and STOA Panel Member

Anthea McINTYRE is a politician and businesswoman and devotes spare time to a range of voluntary-service roles. As Conservative MEP for the West Midlands since 2011, Anthea is the Party's spokesman in the European Parliament on both employment and social affairs, and agriculture and rural affairs. As well as these two key portfolios, she is a member of the temporary committee created to examine regulation of pesticides and acts as coordinator on the committee for her group the European Conservatives and Reformists. She has drafted Parliamentary reports on subjects including smart farming, encouraging entrepreneurs and re-shoring jobs and recently piloted legislation through the Parliament to prevent the import of deadly plant pests from abroad.

Prior to becoming an MEP, she stood for Westminster in the Redditch seat in 1997 and the Shrewsbury and Atcham seat in 2001. Anthea has also served as a Vice Chairman of the Conservative Party and as a member of the Party Board. A lifelong party activist, she is a former deputy chairman of the National Young Conservatives, chairman of the Party's West Midlands Region, chairman of Hereford Conservative Association and, in 1977, became the youngest County Councillor in England.

Outside politics she is a director of MCP Systems, a consultancy specialising in business intelligence systems. Separately she is a partner in a Herefordshire smallholding and vineyard with her husband Frank MYERS MBE. Anthea won the European Woman of Achievement Award for Business in 1997 and in 2009 her work helped win MCP a national award for technological innovation in the Health Service. In the voluntary sector she chairs Herefordshire Conservative Business Forum, is an Ambassador for the Federation of Small Businesses and an official champion of English regional wines. Before becoming an MEP she was a member of the BBC Midlands Advisory Council, Hereford Community Health Council, Midlands Electricity Consultative Council and the Regional Policy Committee of the Federation of Small Businesses.

3.2. Dany BYLEMANS

Prof. dr. ir. Dany BYLEMANS is part-time professor at the Catholic University Leuven and general director of the Research Station for Fruit. Most of his work is in the area of improving crop protection methodologies. He is also chairman of the Working Group 'Decision Support Systems' of the European Fruit Research Institutes Network. He is teaching courses like 'Integrated Pest Management', 'Plant pests and diseases' and 'Postharvest Pest and Disease Management'. For ten years he was also R&D director of the Plant and Material Protection Division of a multinational company.

3.3. Barbara DE CONINCK

Prof. dr. Barbara DE CONINCK (1980, Belgium) received her PhD in 2007 at the Faculty of Science (Biology) KU Leuven under the supervision of Prof. van LAERE and Prof. van den ENDE. In 2007, she started as a postdoctoral researcher at the Plant-Fungi Interactions group within the Centre of Microbial and Plant Genetics (KU Leuven) under the supervision of Prof. CAMMUE. She was leading the Plant Research Unit within this group where she studied the interaction between pathogens and several model plants with a focus on antimicrobial peptides, as well as general plant defense responses. In 2014 she was a visiting scientist at the laboratory of Prof. CRAIK at the University of Queensland and at the group of Prof. K. KAZAN, CSIRO Plant Industry (Australia). After being employed for one year as senior scientist at the VIB department of Plant Systems Biology, she started her own 'Plant Health and Protection' group as assistant professor at the Division of Crop Biotechnics (Biosystems Department, KU Leuven). Her group focuses on how plants, e.g. tomato and strawberry, respond to economically important pathogens in the horticultural sector in order to develop strategies that will minimize disease outbreaks.

3.4. Wannes KEULEMANS

Wannes KEULEMANS is professor at the Department of Biosystems at KU Leuven. He is head of the Laboratory of Fruit Breeding and Biotechnology, which concentrates on research into the genetic control of important biological processes in fruit crops with the aim of improving breeding efficiency and cultivation techniques. Wannes KEULEMANS teaches genetics, breeding, applied plant physiology and in various courses of agronomy. He was coordinator of a Metaforum working group on sustainable food security[1], and together with Tessa AVERMAETE wrote a book about this, *Wat met ons voedsel*, published by Lannoo.

[1] https://www.kuleuven.be/metaforum/docs/pdf/wg_33_n.pdf

3.5. Anne van DRUNEN LITTEL

Anne van DRUNEN LITTEL works as sustainability and economic impact consultant for Steward Redqueen. Anne is involved in sustainability strategy and management, impact measurement, innovation and evaluation projects, with a specific focus on agricultural operations and finance in developing and emerging markets. Anne has a focus on the agro-food sector, working with both private and public sector organisations. Her clients include agro-focused commercial banks and development finance organisations, network organisations, leading multinational companies in the sector and FMCG companies that source from the sector. She leads a Europe-wide agricultural impact assessment programme for ECPA (European Crop Protection Association), a project that covers 16 EU agricultural markets and over 30 different crops. Prior to joining Steward Redqueen, Anne worked with, amongst others, the Dutch Ministry of Foreign Affairs and Hindustan Unilever. She holds a cum laude MSc in International Public Policy from University College London.

3.6. Isabelle LANG

IFOAM EU is the European umbrella organisation for organic food and farming. IFOAM EU fights for the adoption of ecologically, socially and economically sound systems based on the principles of organic agriculture – ¬health, ecology, fairness and care. With more than 200 member organisations the work spans the entire organic food chain and beyond: from farmers and processors, retailers, certifiers, consultants, traders and researchers to environmental and consumer advocacy bodies. Plant Protection in organic farming is a systems approach focusing on plant health starting with the selection of robust varieties, the management of agro-biodiversity and occasionally uses natural inputs. Organic farming plays a very important role as a pioneer in the development and the introduction of preventive measures and innovative biocontrol solutions for plant health care.

Isabella LANG is Policy Analyst working with IFOAM EU since one and a half years on inputs for organic farming and is coordinating the internal sector group of organic farmers at IFOAM EU. She holds a master's degree in organic farming from the University of Natural Resources and Life Sciences in Vienna. Besides the theoretical knowledge she gained practical work experience on organic and conventional managed farms in Europe, Latin America and Africa.

3.7. Marleen ONWEZEN

Marleen ONWEZEN studied social psychology at Tilburg University and received her PhD on emotions and sustainable consumer choices in 2014. She works already for ten years as a senior researcher at Wageningen Economic Research. She is a strategic senior scientist who sets the research agenda for consumer behaviour. Additionally, she manages projects that focus on consumer choices for sustainable and healthy food, aiming to answer how consumer choices can be explained and guided. Topics she works with are for example emotions, social norms, values, habits and social identification. She explores these topics via traditional quantitative research methods (e.g., survey and experiment) or novel technologies like a virtual supermarket or mobile applications.

4. About STOA

4.1. Mission

The Panel for the Future of Science and Technology (STOA) forms an integral part of the structure of the European Parliament. Launched in 1987, STOA is tasked with identifying and independently assessing the impact of new and emerging science and technologies.

The goal of its work is to assist, with independent information, the Members of the European Parliament (MEPs) in developing options for long-term, strategic policy-making.

The STOA Panel

The STOA Panel consists of 25 MEPs nominated from the nine permanent parliamentary committees: AGRI (Agriculture & Rural Development), CULT (Culture & Education), EMPL (Employment & Social Affairs), ENVI (Environment, Public Health & Food Safety), IMCO (Internal Market & Consumer Protection), ITRE (Industry, Research & Energy), JURI (Legal Affairs), LIBE (Civil Liberties, Justice and Home Affairs) and TRAN (Transport & Tourism).

Ramón Luis VALCÁRCEL SISO MEP is the European Parliament Vice-President responsible for STOA for the second half of the 8th legislature. The STOA Chair for the second half of the 8th legislature is Eva KAILI with Paul RÜBIG and Evžen TOŠENOVSKÝ elected as 1st and 2nd Vice-Chairs respectively.

The STOA approach

STOA fulfils its mission primarily by carrying out science-based projects. Whilst undertaking these projects, STOA assesses the widest possible range of options to support evidence-based policy decisions. A typical project investigates the impacts of both existing and emerging technology options and presents these in the form of studies and options briefs. These are publicly available for download via the STOA website: www.europarl.europa.eu/stoa/.

Some of STOA's projects explore the long-term impacts of future techno-scientific trends, with the aim to support MEPs in anticipating the consequences of developments in science. Alongside its production of 'hard information', STOA communicates its findings to the European Parliament by organising public events throughout the year. STOA also runs the MEP-Scientist Pairing Scheme aimed at promoting mutual understanding and facilitating the establishment of lasting links between the scientific and policy-making communities.

Focus areas

STOA activities and products are varied and are designed to cover as wide a range of scientific and technological topics as possible, such as nano-safety, e-Democracy, bio-engineering, assistive technologies for people with disabilities, waste management, cybersecurity, smart energy grids, responsible research & innovation, sustainable agriculture and health.

They are grouped in five broad focus areas: eco-efficient transport and modern energy solutions; sustainable management of natural resources; potential and challenges of the Internet; health and life sciences; science policy, communication and global networking.

ESMH

The European Science-Media Hub (ESMH), operating under the political responsibility of the STOA Panel, is a new platform to promote networking, training and knowledge sharing between the European Parliament, the scientific community and the media. The ESMH creates a network among policy-makers, scientists and media involving science, academia, educational and research entities, professional associations of journalists and scientists.

For journalists and media representatives, the ESMH organises training and workshops on current technological developments, both as subjects of their reporting and as means of facilitating their work. Via media monitoring and media intelligence tools, the ESMH follows the most popular topics in the field of science and technology on different platforms including magazines, newspapers and social media.

The ESMH will make information available to journalists, other media and citizens about new scientific developments, as well as about scientific topics that attract media attention and promote information based on evidence.

4.2. STOA Bureau

Ramón Luis VALCÁRCEL SISO
(EPP, ES)
EP Vice-President responsible for STOA

Eva KAILI (S&D, EL)
Chair of STOA

Committee on Industry, Research and Energy
(ITRE)

Paul RÜBIG (EPP, AT)
First Vice-Chair of STOA

Committee on Industry, Research and Energy
(ITRE)

Evžen TOŠENOVSKÝ (ECR, CZ)
Second Vice-Chair of STOA

Committee on Industry, Research and Energy
(ITRE)

4.3. STOA Panel members

Tiziana **BEGHIN**
(EFDD, IT)

EMPL Committee

Michał **BONI**
(EPP, PL)

LIBE *Committee*

*Renata **BRIANO***
(S&D, IT)

ENVI Committee

Carlos **COELHO**
(PPE, PT)

IMCO Committee

Mady **DELVAUX**
(S&D, LU)

JURI Committee

Christian **EHLER**
(EPP, DE)

ITRE Committee

Maria Teresa **GIMÉNEZ BARBAT**
(ADLE, ES)

CULT Committee

Andrzej **GRZYB**
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ENVI Committee

Danuta **JAZŁOWIECKA**
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EMPL Committee

Jan **KELLER**
(S&D, CZ)

EMPL Committee

Bogusław **LIBERADZKI**
(S&D, PL)

TRAN Committee

Anthea **McINTYRE**
(ECR, UK)

AGRI Committee

Momchil **NEKOV**
(S&D, BG)

AGRI Committee

Marijana **PETIR**
(EPP, HR)

AGRI Committee

Michèle **RIVASI**
(Greens/EFA, FR)

ITRE Committee

Virginie **ROZIERE**
(S&D, FR)

IMCO Committee

Claudia **SCHMIDT**
(EPP, AT)

TRAN Committee

Kay **SWINBURNE**
(ECR, UK)

ENVI Committee

Neoklis **SYLIKIOTIS**
(GUE/NGL, CY)

ITRE Committee

Anneleen **VAN BOSSUYT**
(ECR, BE)

IMCO Committee

Kosma **ZŁOTOWSKI**
(ECR, PL)

TRAN Committee

Parliamentary Committees:
AGRI: Agriculture and Rural Development
CULT: Culture and Education
EMPL: Employment and Social Affairs
ENVI: Environment, Public Health and Food Safety
IMCO: Internal Market and Consumer Protection
ITRE: Industry, Research and Energy
JURI: Legal Affairs
TRAN: Transport and Tourism

4.4. STOA Administration

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