



Internal Co-ordination Group for Biotechnology

BIOTECHNOLOGY UPDATE

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Biotechnology Update

Internal Co-ordination Group for Biotechnology (ICGB)

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This newsletter provides up-to-date information on activities related to biotechnology or the life sciences more generally at the Organisation for Economic Co-operation and Development (OECD). It is mainly intended for OECD staff and delegates to OECD meetings who are already familiar with certain aspects of the Organisation's work. We hope that it is also informative for the wider biotech community.

The contents of this 'Biotechnology Update' newsletter have been provided by those members of the OECD Secretariat who are responsible for the various activities. The Secretariat can be contacted via the e-mail address: ehscont@oecd.org. Alternatively, individuals can be contacted via e-mail using the form firstname.lastname@oecd.org (See Who's Who list at the end of the newsletter).

Visitors of the [OECD website](http://www.oecd.org) can choose to receive automatically future editions of Biotechnology Update through "My OECD" by ticking the 'Biotechnology' box.



ABOUT OECD'S INTERNAL CO-ORDINATION GROUP FOR BIOTECHNOLOGY (ICGB)

The Organisation for Economic Co-operation and Development (OECD) and its member countries have been addressing issues related to biotechnology since 1982.

From that time, biotechnology has had an increasing impact on the programmes of different sectors at OECD such as: agriculture and trade; environment; science, technology and innovation. In 1993, the Internal Co-ordination Group for Biotechnology (ICGB) was established to facilitate co-ordination among these sectors.

Bertrand Dagallier, Head of OECD's Biosafety and Novel Foods/Feeds Safety Programmes, is the Executive Secretary of the ICGB, who is the editor of the ICGB Newsletter with the contribution of Ryudai Oshima.

Contacts: Bertrand Dagallier, Ryudai Oshima (ENV/EHS)



GREEN GROWTH AND SUSTAINABLE DEVELOPMENT



The 2020 OECD Green Growth and Sustainable Development (GGSD) Forum on “Securing natural capital: Resilience, risk management and Covid-19” will be held on 25-26 November 2020.

The COVID-19 pandemic has highlighted the lack of resilience of our socioeconomic systems globally. The links between biodiversity loss and other natural capital and risks these impose on human health and our economies is more evident than ever. Yet natural capital – the biodiversity and ecosystem services upon we depend - is rapidly deteriorating. Since 1970, one tenth of the world’s terrestrial biodiversity and one third of freshwater biodiversity has been lost. Deforestation continues and land degradation has reduced productivity of 23 per cent of the global terrestrial area. Coastal waters are deteriorating due to pollution and coastal eutrophication is expected to increase by 20 percent in large marine ecosystems by 2050.

These trends of natural capital erosion can profoundly affect the resilience of our societies, with biodiversity loss among the top global risks to the society. The deterioration of natural capital threatens the productivity of several economic sectors, ranging from agriculture and fisheries to tourism and industry. At the same time, the drivers of biodiversity loss, such as deforestation, over-exploitation of natural resources, and wildlife trade, and climate change are helping to create the conditions for pathogens to leap from animals to humans. Furthermore, the recent spread of new diseases from livestock and the homogeneity of farmed species underline the importance of increasing resilience and security of our food system.

Under the overarching theme of “Securing natural capital: Resilience, risk management and Covid-19”, the Forum will address the risks posed by unmitigated biodiversity loss and natural capital depletion for the resilience of our societies, and how the COVID-19 pandemic is re-shaping the policy debate on these issues. The Forum will explore the challenges for agriculture and fisheries sector to contribute to the SDGs agenda, the progress towards measuring progress in securing life on land (SDG 14) and under water (SDG 15), how to best mobilise finance for biodiversity and how nature-based solutions can help to improve the resilience of our societies to the impact of climate change.

Contacts: Kumi Kitamori, Enrico Botta (ENV/GGGR)

Website: <http://www.oecd.org/greengrowth/ggsd-forum.htm>

BIO-ECONOMY AND THE SUSTAINABILITY OF THE AGRICULTURE AND FOOD SYSTEM

Background

The vision of a bio-economy – an economy based primarily on biogenic instead of fossil resources – has gained prominence in policy debate in recent years and several countries are developing bio-economy strategies as a new development vision to decouple economic growth from dependence on fossil fuel, and as a pathway towards supporting the achievement of some of the UN Sustainable Development Goals (SDGs) and the commitments under the Paris Climate Agreement.

Food and agriculture is a central part of the bio-economy.

Bio-economy at OECD Trade and Agriculture Directorate

As part of its work on improving sustainability in food and agriculture a study was carried out to review the available evidence on the new opportunities for using natural resources that have been brought about by the technical progress of microbiology, which has given rise to the emerging bio-economy. A complete draft report of the study was declassified at the April 2019 JWP AE meeting and subsequently published as OECD Food, Agriculture and Fisheries Paper No.136.

This report analyses the opportunities and policy challenges facing the bio-economy in transitioning towards a more sustainable agro-food system. It provides an overview of official national bio-economy-related strategies, based primarily on a literature review and information provided by governments in response to a questionnaire.

The bio-economy can provide an important contribution to sustainable development of the agro-food system, but concrete empirical evidence of the net overall economic, environmental and social impacts is lacking. Better monitoring and assessment is needed. Furthermore, the development of the bio-economy is not intrinsically sustainable and trade-offs and risks are unavoidable. The report also provides policy recommendations for a bio-economy that contributes towards a sustainable agro-food system. It is stressed that achieving successful implementation of bio-economy strategies depends on holistic cross-cutting policy approaches to facilitate market development and build consumer trust.

An OECD/Dutch Ministry of Agriculture, Nature and Food Quality Workshop on the Circular Approach and the Sustainability of the Agro-food System - Closing Resource Loops to Improve Sustainability was held on 3 April 2019. More than 60 participants, covering a wide spectrum of expertise and interests, attended the Workshop. The papers and PowerPoints presented can be downloaded from the Workshop's website: <https://oe.cd/casafs>.

Recent publications:

- 📖 Diakosavvas, D. and C. Frezal (2019), "Bio-economy and the Sustainability of the Agriculture and Food System: Opportunities and Policy Challenges", OECD Food, Agriculture and Fisheries Papers, No. 136, OECD Publishing, Paris, <http://dx.doi.org/10.1787/d0ad045d-en>.
- 📖 OECD (2019), "Chapter 4: Bio-economy Policies and Practices by Country", in Bio-economy and the Sustainability of the Agriculture and Food System: Opportunities and Policy Challenges, COM/TAD/CA/ENV/EPOC(2018)15/FINAL, OECD Publishing, Paris, [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=COM/TAD/CA/ENV/EPOC\(2018\)15/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=COM/TAD/CA/ENV/EPOC(2018)15/FINAL&docLanguage=En).

Upcoming event:

- Joint Working Party on Agriculture and the Environment, 50th Session, OECD Paris, 26-28 October 2020.

Contact: Dimitris Diakosavvas (TAD/ARP)



GLOBAL FORUM ON BIOTECHNOLOGY

The Global Forum on Biotechnology, established in 2010, is one of 15 Global Fora created by OECD Committees. Global Fora are not official OECD bodies (except one¹), but are best described as broad communities or networks of stakeholders in the areas of responsibility of one or more Committees.

¹ The Global Forum on Transparency and Exchange of Information for Tax Purposes is governed by different rules than the OECD's other Global Fora.

OECD Committees have an interest in hearing the views of these stakeholders, but their capacity to accommodate (non-Member) Partners as Participants or Associates is limited.

The OECD Global Fora provide platforms for peer learning and policy dialogue on issues which require interaction with Partners world-wide. They can also promote multidisciplinary and horizontal approaches beyond the scope of any single Committee and foster partnerships with other intergovernmental organisations.

OECD Global Fora bring together government officials, policy analysts, business leaders, academic experts, researchers and various other stakeholders. Many Global Forum meetings are major events, attracting large numbers of participants from different regional and cultural backgrounds. They contribute to create active networks of policy makers in Member and Partner economies, to build consensus on what are the most effective policies and to identify “next-generation” issues. The principal functions of Global Fora are to:

- Help the Committees identify relevant issues, including newly emerging ones;
- Promote a convergence of views on the Committees’ outputs among a broad range of Members and Partners;
- Ensure that these outputs are known and used among these stakeholders;
- Share best practices in the implementation of the results.

The Global Forum on Biotechnology supports the activities and networks in the field of biotechnology developed by 1) the Committee for Scientific and Technological Policy, and 2) the Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology. For instance, the Global Forum on Biotechnology provides the adequate framework to support the participation of several delegates from non-Member countries in the plenary meetings and associated activities of the Working Group on Harmonisation of Regulatory Oversight in Biotechnology, as well as the Working Group for the Safety of Novel Foods and Feeds.

Website: General information on the Global Fora: www.oecd.org/global-relations/globalforums/

Contact: Bertrand Dagallier (ENV/EHS)



HARMONISATION OF REGULATORY OVERSIGHT IN BIOTECHNOLOGY

The OECD’s Working Group on Harmonisation of Regulatory Oversight in Biotechnology (WG-HROB) deals with the environmental safety of genetically-engineered organisms (plants, animals, micro-organisms). The work aims to ensure that the types of elements used in biosafety assessment, as well as the methods to collect such information, are as similar as possible amongst countries. This improves mutual understanding and harmonised practice, which in turn, increases the efficiency of the biosafety assessment process, limits duplication of effort, while reducing barriers to trade.

The WG-HROB participants are mainly officials responsible for the environmental risk/safety assessment of products derived from modern biotechnology. Observer delegations and invited experts collaborate actively, given the increasing use of biotech products and breeding activities worldwide. They include key partners (Brazil, P.R. China, India, Indonesia, South Africa), other interested countries (e.g. Argentina, Costa Rica, Kenya, Paraguay, Philippines, Russian Federation, Uruguay, Viet Nam); FAO; UNEP; the Convention on Biological Diversity Secretariat; the African Biosafety Network of Expertise (AUDA NEPAD-ABNE) and Business at OECD (BIAC). Participation from non-OECD countries is supported by the Global Forum on Biotechnology.

The publication of Consensus/Guidance Documents remains a major output of the programme. They constitute a set of practical tools for regulators and biosafety assessors dealing with new transgenic plant varieties and organisms, with respect to environmental safety. The 58 Consensus Documents issued to date address a range of subjects including the biology of crops (recently on apple and tomato), trees and micro-organisms, as well as selected traits that have been introduced in plants. Two of them have been also published on animal species, dealing with the biology of Atlantic salmon (2017) and mosquito *Aedes aegypti*

(2018) where engineered strains are being used to fight against dengue fever and other tropical diseases spread. Other key issues in the context of environmental risk assessment are also covered, including low level presence of transgenic plants in conventional seed and commodities. All these documents are available through the OECD website (www.oecd.org/science/biotrack/).

Works under development by the WG-HROB are as follows:

- Crop species: the biology of safflower, the revision of the rice and wheat biology documents;
- Animals: the biology of mosquito *Anopheles gambiae* that is the main vector of malaria; a kick-off meeting for the project was held in Ethiopia in March 2019;
- Micro-organisms: the use of phototrophic micro-algae for production purposes;
- Biosafety assessment key issues: Environmental Considerations for the release of transgenic plants, for which a publication is expected in 2020-21; and New Breeding Techniques;
- Joint bio-food safety projects contemplated for future work: reviewing/adapting the Council Recommendation on recombinant DNA organisms; applying the “safe-by-design” concept to biotechnology products; and quantifying the benefit of OECD work on bio and food/feed safety.

Upcoming event:

- 35th Meeting of the Working Group on the Harmonisation of Regulatory Oversight in Biotechnology, OECD, 1-3 March 2021.

Recent publications:

- 📖 *Updated “Points to Consider for Consensus Documents on Biotechnology of Cultivated Plants”* (2020)
- 📖 *Consensus Document on the Biology of Apple (*Malus x domestica*)* (2019)

Upcoming publication:

Consensus Document on the Biology of Safflower (*Carthamus tinctorius*) (available soon)

Website: BioTrack Online www.oecd.org/biotrack/

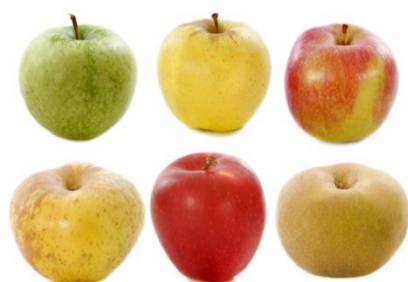
Contacts: Ryudai Oshima, Bertrand Dagallier, Natsuo Komoto (ENV/EHS)



SAFETY OF NOVEL FOODS AND FEEDS

The OECD Working Group for the Safety of Novel Foods and Feeds (WG-SNFF) addresses aspects of the safety assessment of foods and feeds derived from genetically engineered crops. The work aims to ensure that the types of elements used in risk/safety assessment, as well as the methods to collect such information, are as similar as possible amongst countries. The approach is to compare transgenic crops and derived products with similar conventional ones that are already known and considered safe in their use, based on recognised experience. Harmonised methods and practice, as well as share of data are facilitated through the WG-SNFF activities.

Consensus documents



The main output is the set of consensus documents on compositional considerations of new varieties of specific crops. These documents compile a common base of scientific information on the major components of the plants and their derived products: key nutrients; toxicants; anti-nutrients; and allergens where relevant. Other publications deal with general aspects to facilitate harmonisation in safety assessment. These documents constitute practical tools for regulators and risk assessors dealing with new transgenic varieties, with respect to human food and animal feed safety. To date, 28 Consensus Documents have been published on major crops and

mushrooms, the animal feedstuffs, as well as the molecular characterisation of plants derived from modern biotechnology developed in common with the WG-HROB. They are available through the OECD website (www.oecd.org/biotrack). The Compendium of consensus documents issued from 2015 to 2019 on the composition of common bean, rice, cowpea and apple (Volume 3 of the Novel Food and Feed Safety series) was published in November 2019.

On-going projects focus on updating the maize and potato composition documents. Future activities might include the development of guidance documents on enabling joint reviews of novel foods and feeds, and on the safety assessment of emerging feed ingredients. Joint WG-HROB/WG-SNFF projects are also contemplated for future work: reviewing/adapting the Council Recommendation of recombinant DNA organisms; applying the “safe-by-design” concept to biotechnology products; and quantifying the benefit of OECD work on bio and food/feed safety.

New plant breeding techniques

Information sharing on new plant breeding techniques and associated tools continues within the WG-SNFF. The WG-SNFF took an active part in the preparation and implementation of the OECD Genome Editing Conference held in June 2018 and described below.

Outreach and Engagement of Non Member Economies

The WG-SNFF has increasingly involved the experience, scientific knowledge and interests of non-member economies, which allows it to address a wider range of food and feed products of global interest. Brazil, South Africa and Thailand, for example, were actively involved in the drafting of consensus documents on compositional considerations for cowpea, cassava, papaya as well as other tropical crops. The WG-SNFF benefits also from the expertise of specialists from Argentina, Costa Rica, India, Kenya, Paraguay, Philippines, Uruguay, Viet Nam and the African Biosafety Network of Expertise (AUDA NEPAD-ABNE). Such participation was made possible through the OECD's Global Forum on Biotechnology.

Upcoming events:

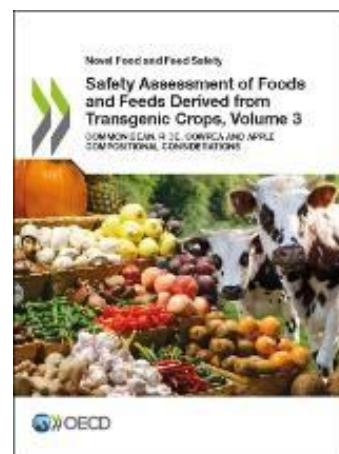
- 28th Meeting of the Working Group on the Safety of Novel Foods & Feeds, OECD, 3-5 March 2021

Recent publications:

- 📖 [Consensus Document on Compositional Considerations for New Varieties of Apple](#) (*Malus × domestica* Borkh.): Key Food and Feed Nutrients, Allergens, Toxicants and Other Metabolites (2019)
- 📖 [Safety Assessment of Foods and Feeds derived from Transgenic Crops, Volume 3](#): Common bean, Rice, Cowpea and Apple compositional Considerations (2019)

Website: BioTrack Online www.oecd.org/biotrack

Contacts: Bertrand Dagallier, Ryudai Oshima, Natsuo Komoto (ENV/EHS)





BIOTRACK ONLINE

The BioTrack Online information system is a mechanism by which the Working Group on Harmonisation of Regulatory Oversight in Biotechnology and the Working Group for the Safety of Novel Foods and Feeds make publicly available the outputs of their work, especially their Consensus/Guidance Documents described in sections above.

BioTrack Online offers also a public access to the “Product Database”. This database allows regulatory officials to easily share basic information on transgenic products derived from the use of modern biotechnology (mainly crop plants) and approved for commercial application in terms of food, feed or environmental safety. The database is updated, on a voluntary basis, by authorities of countries participating in the OECD biosafety activities. Products are listed with unique identifiers, and the information includes common/scientific names of the host organism and introduced genes, the events and traits, the regulatory elements and relevant links regarding approvals for release and use in countries.

Information on new or updated entries provided by Brazil, Canada, Colombia for the first time, Korea and the European Commission was added to the Product Database during the first half of 2020. Currently, the database includes 344 products of transgenic crops and flowers from 21 plant species (gypsophila and chrysanthemum being new species from this year), products approved in one (or several) of 16 countries and the European Community.

BioTrack Online also contains the regulatory contacts of OECD member countries and other stakeholders involved in biosafety and novel food/feed safety.

The co-operation continues between the OECD’s Product Database, the CBD Biosafety Clearing-House and the FAO GM Food Platform, for interoperability between these web-based systems and facilitating the exchange of information on safety assessment of transgenic organisms and foods. This activity responds to a request from the Codex ad hoc Task Force on Food Derived from Biotechnology, and a Memorandum of Cooperation signed between OECD and the Secretariat of the Convention on Biological Diversity.

Website: BioTrack Online www.oecd.org/biotrack
Products Database <https://biotrackproductdatabase.oecd.org>

Contacts: Ryudai Oshima, Bertrand Dagallier (ENV/EHS)



BIODIVERSITY ECONOMICS AND POLICY

Biodiversity work at the OECD focuses on the economics and policies needed to promote the effective conservation and sustainable use of biodiversity, land use, and ecosystems (BLUE). It includes areas such as biodiversity valuation, the use of economic instruments and other policy measures, biodiversity mainstreaming and finance. This work also supports the Convention on Biological Diversity (CBD). The work is conducted under the oversight of the OECD Working Party on Biodiversity, Water and Ecosystems (WPBWE), a subsidiary body of the Environment Policy Committee (EPOC).

Biodiversity, including forests, wetlands, and marine ecosystems, is fundamental to sustaining life. Biodiversity provides critical ecosystem services such as food provisioning, water purification, nutrient cycling, and climate regulation, all of which are essential to support human well-being and economic growth. Despite the significant economic, social and cultural benefits provided by biodiversity and ecosystem services, global biodiversity is declining.



At the request of G7 Environment Ministers, the report [A Comprehensive Overview of Global Biodiversity Finance](#) was prepared, and released in April 2020. The document examines public and private flows of biodiversity finance and provides an aggregate estimate of global biodiversity finance. It also examines government support potentially harmful to biodiversity, which is estimated to be at least five times larger than total finance for biodiversity. Finally, the report provides recommendations for improving the assessment, tracking and reporting of biodiversity finance.

The brochure on [Tracking Economic Instruments and Finance for Biodiversity](#), updated in April 2020, highlights trends in the use of biodiversity-relevant economic instruments (such as taxes, fees and charges, tradable permits and positive subsidies) and the finance they mobilise, based on available data in the OECD Policy Instruments for the Environment (PINE) database. The data are used to monitor progress towards Aichi Biodiversity Target 3 (on incentives), as well as Sustainable Development Goal Target 15.a. on finance.

The report [Towards Sustainable Land Use: Aligning Biodiversity, Climate and Food Policies](#), released in January 2020, examines on-going challenges for aligning land-use policy with climate, biodiversity and food objectives, and the opportunities to enhance the sustainability of land-use systems. It looks at six countries – Brazil, France, Indonesia, Ireland, Mexico and New Zealand – with relatively large agricultural and forestry sectors and associated greenhouse gas emissions, many of which host globally important biodiversity. Drawing on these countries' national strategies and plans, institutional co-ordination and policy instruments, the report provides good practice insights on how to align land use decision-making processes and to achieve stronger coherence between land use, climate, ecosystems and food objectives.

[Managing the biodiversity impacts of fertiliser and pesticide use: Overview and insights from trends and policies across selected OECD countries](#) reviews the impacts and costs of pesticide and fertiliser pollution as well as the policy responses to counter these. The paper (2020) begins with an overview of the main biodiversity and health impacts of excess pesticide and fertiliser. It then provides an overview of the trends in pesticide sales and use, and soil nutrient balances in OECD countries, before reviewing policy instruments available to promote more sustainable fertiliser and pesticide use. Case studies of specific policy responses are presented for Denmark, France, Japan and the United States. Based on the literature review and case studies, the paper concludes with policy insights and recommendations.

The second iteration of the report [The Post-2020 Biodiversity Framework: Targets, indicators and measurability implications at the global and national level](#), was released in time for the CBD SBSTTA meeting on 25-29 November 2019, in Montreal Canada. The report examines how new targets in the post-2020 biodiversity framework can be more specific and measurable than the existing Aichi targets; and what indicators are currently available to monitor progress towards these targets in a consistent and comparable way across countries. As part of this project, the OECD convened [an international expert workshop](#) in Paris on 26 February 2019. Experts and stakeholders from the policy, scientific, and NGO communities exchanged views on the development of the post-2020 global biodiversity framework.

The report [Biodiversity: Finance and the Economic and Business Case for Action](#), prepared for the French G7 Presidency and the G7 Environment Ministers' Meeting in May 2019, sets the economic and business case for urgent and ambitious action on biodiversity. It presents a preliminary assessment of current biodiversity-related finance flows, and discusses the key data and indicator gaps that need to be addressed to underpin effective monitoring of both the pressures on biodiversity and the actions (i.e. responses) being implemented.

[Evaluating the effectiveness of policy instruments for biodiversity: Impact evaluation, cost-effectiveness analysis and other approaches](#). This report (Dec. 2018) provides an overview of methodologies to evaluate the effectiveness of policy instruments for biodiversity, covering impact evaluation, cost-effectiveness analysis and other more commonly used approaches. It then provides an inventory of biodiversity-relevant impact evaluation studies, across both terrestrial and marine ecosystems. The report concludes with lessons learned, policy insights and suggestions for further work.

[Mainstreaming Biodiversity for Sustainable Development](#). This publication (July 2018) draws on experiences and insights from 16 of the most biodiversity-rich countries worldwide, and provides good practice insights for mainstreaming biodiversity in four areas: 1) at the national level; 2) in the agriculture, forestry and fisheries sectors; 3) in development co-operation; 4) in monitoring and evaluation efforts.

Soon-to-be-released work includes a report on Sustainable ocean economies: Harnessing the benefits for developing countries. Other on-going OECD work on biodiversity is focussing on tracking economic instruments and finance for biodiversity, and developing guidance to identify and assess subsidies harmful to biodiversity at the national level.

Events:

OECD BLUE and UNDP BIOFIN (Biodiversity Finance Initiative) convened a [Virtual Global Conference on Biodiversity Finance](#), on 15, 22 and 29 April, 2020. The event brought together over 500 participants from 73 countries to examine trends and share lesson on scaling up, tracking and aligning biodiversity finance.

Recent publications and working papers:

- 📖 OECD (2020), A Comprehensive Overview of Global Biodiversity Finance.
- 📖 OECD (2020), Tracking Economic Instruments and Finance for Biodiversity 2020 (brochure).
- 📖 OECD (2020), Towards Sustainable Land Use: Aligning biodiversity, climate and food policies.
- 📖 OECD (2020), Biodiversity and Agriculture: Pesticide and fertiliser trends and policies across selected OECD countries.
- 📖 OECD (2019), Biodiversity: Finance and the Economic and Business Case for Action.

Upcoming publications and working papers:

Developing guidance to identify and assess subsidies harmful to biodiversity at national level

Website: www.oecd.org/environment/resources/biodiversity/

Contacts: Katia Karousakis, Edward Perry (ENV/CBW)



OECD CONFERENCE ON REGULATION OF EXTERNALLY APPLIED dsRNA-BASED PRODUCTS FOR THE MANAGEMENT OF PESTS

The OECD Conference on Regulation of Externally Applied dsRNA-based Products for the Management of Pests was held at the OECD Headquarters on 10-12 April 2019. The event benefitted from financial support from the OECD Co-operative Research Programme: Biological Resource Management for Sustainable Agricultural Systems (CRP).

The Expert Group on RNAi-based pesticides (**EGRNAi**) – a sub-body of the OECD Working Group on Pesticides - organised the conference and coordinated the preparation of the conference with the Federal Office of Consumer Protection and Food Safety (BVL) in Germany, the European Food Safety Authority and the US Environmental Protection Agency.

Around 60 people from academia, government, industry and other stakeholders participated in this event. The main objectives of the OECD conference were:

- to provide participants with a summary of the state of the art of double-stranded RNA (dsRNA)-based product used in agriculture;
- to exchange information on the current status and future possibilities for the regulation of externally applied dsRNA-based products that are proposed for use as pesticides;



- to facilitate discussions on the impact of the use of dsRNA pesticides on the environment and health and implications for current regulations; and
- to inform regulatory policy and facilitate harmonised approaches across governments.

Invited speakers included experts in the varying aspects of RNA interference (RNAi), and their presentations summarised product developments, environmental fate, exposure to externally applied dsRNA in non-target organisms, lessons from human therapeutic use of dsRNA, and key points from previous regulatory reviews of dsRNA-based crop traits.

The first session provided a background on the molecular mechanism of RNAi and relevant related pathways, reviewed the current understanding of cross-kingdom RNAi, examined the species-specificity of these dsRNAs on non-target species and discussed challenges related to the RNAi-efficiency in insects.

The second session dealt with the research to date that investigated the factors that affect insects' responsiveness to environmental dsRNA, covered approaches to assess biodegradation of dsRNA in different matrices and explored the role of certain technology to predict genetic changes and the impact in terms of efficacy of the RNAi products in target pests. It also summarised the published literature related to dietary uptake of external dsRNA in humans and addressed the lessons learnt from human therapeutic use of dsRNA.

The third and final session focused on how problem formulation can guide risk assessments for spray applications of pesticides containing dsRNA, and considered potential pathways and testable risk hypotheses in the context of environmental risk assessment. It also covered the experience of experts involved in the risk assessment of genetically-modified crop plants, which incorporate the machinery to synthesise RNA molecules specifically directed against a pest species feeding on the crop (so-called 'plant-incorporated protectants', or PIPs).

Certain topics and considerations that were raised during the conference will be incorporated in the draft OECD Working Document "Environmental Risks from the Application of sprayed or externally applied dsRNA-Based Pesticides: Issues for Consideration" under development by the EGRNAi. It will also inform the future work by the Expert Group on a second Working Document that will cover human health risk assessment of dsRNA-based pesticides.

Information about the conference, including the programme, speakers, abstracts, presentation files and other related material is available online (see below). The conference proceedings, including a meeting report and a written version of each presentation, are expected to be published either as a special issue in a peer-reviewed journal or as an OECD document in coming months.

Website: <http://www.oecd.org/chemicalsafety/pesticides-biocides/conference-on-rnai-based-pesticides.htm>

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OECD CONFERENCE ON GENOME EDITING: APPLICATIONS IN AGRICULTURE - IMPLICATIONS FOR HEALTH, ENVIRONMENT AND REGULATION



With the help of the OECD's Central Priority Fund which supports topics of multi-disciplinary nature, the OECD Conference on Genome Editing: Applications in Agriculture – Implications for Health, Environment and Regulation was held at the OECD Headquarters on 28-29 June 2018. The event was also sponsored by OECD's Co-operative Research Programme (CRP) and United States Department of Agriculture, Foreign Agricultural Service (USDA-FAS).

The conference was jointly organised by several OECD Directorates, including Environment (ENV), Science, Technology and Innovation (STI), Trade and Agriculture (TAD) and Public Governance and Territorial Development (GOV). The Environment Directorate led the project and coordinated the preparation of the conference through the Internal Co-ordination Group for Biotechnology (ICGB).

More than 200 people from academia, government, industry and other stakeholders participated in this event. It aimed to identify the issues or possible challenges posed by genome-edited products in agriculture especially for regulators and risk assessors. The Conference Programme was organised to address these challenges in three main sessions: i) applications of genome editing in agriculture; ii) risk and safety considerations; and iii) regulatory aspects. The conference information including the programme, speakers, abstracts, presentation files and other related information is available online.

The Meeting Report and the Proceedings of this Conference were published in the journal *Transgenic Research* in August 2019. They contain summaries of the lectures and panel discussions, together with background information including the context of OECD work on genome editing. Twenty-four invited presenters contributed to these Proceedings with articles summarising their presentations.

Two short articles on policy considerations and overview of regulatory approaches regarding genome editing were also prepared based on the discussion during the Conference, and has been published online in the journals *Trends in Biotechnology* and *Biotechnology Research and Innovation*.

Recent publications:

- 📖 Proceedings of the OECD Conference on “Genome Editing: Applications in Agriculture—Implications for Health, Environment and Regulation”, *Transgenic Research*, Vol. 28, Issue 2 Supplement (2019), Springer Nature, <https://link.springer.com/journal/11248/28/2/suppl>.
- 📖 Meeting report of the OECD conference on “Genome Editing: Applications in Agriculture—Implications for Health, Environment and Regulation”, *Transgenic Research*, Vol. 28, Issue 3-4, pp. 419-463 (2019), Springer International Publishing, <https://doi.org/10.1007/s11248-019-00154-1>.
- 📖 Friedrichs, S. et al. (2019), “Policy Considerations Regarding Genome Editing”, *Trends in Biotechnology*, Vol. 37, Issue 10, pp. 1029-1032, Elsevier, <https://doi.org/10.1016/j.tibtech.2019.05.005>.
- 📖 Friedrichs, S. et al. (2019), “An overview of regulatory approaches to genome editing in agriculture”, *Biotechnology Research and Innovation*, Elsevier, <https://doi.org/10.1016/j.biori.2019.07.001>.

Website: <http://www.oecd.org/environment/genome-editing-agriculture/>

Contacts: Bertrand Dagallier, Ryudai Oshima (ENV/EHS)



NEUROTECHNOLOGY

New Recommendation of the Council on Responsible Innovation in Neurotechnology

Under the auspices of the Working Party on Bio-, Nano-, and Converging Technologies and the Committee on Scientific and Technological Policy, the OECD Council adopted in December 2019 the [Recommendation of the Council on Responsible Innovation in Neurotechnology](#), the first international standard in this domain. Four years in the making, it aims to help governments and innovators anticipate and address the various ethical, legal and social challenges raised by new neurotechnologies, while still promoting innovation in the field. The underlying aim is not to constrain technology, but to shape pathways that enable it.

Scientists have spent decades trying to unlock the mysteries of the brain, in an effort to better diagnose and treat some of the most confounding diseases and disorders. Now, thanks to groundbreaking developments in brain science and neurotechnology, they seem closer than ever before.

Fuelled by the convergence of neuroscience, engineering, digitalisation and artificial intelligence (AI), these technologies have tremendous potential to improve health, well-being and productivity across the globe – and their effects are already being felt. Brain computer interfaces and new imaging approaches have opened up new avenues for diagnosis, monitoring, prevention and therapy in Alzheimer's and other neurodegenerative diseases; and brain implants are already being used to stimulate neural activity in patients suffering from Parkinson's disease. Researchers are even working to embed neurons and brain-like structures within computer chips that could provide a new way to conduct pre-clinical tests and diagnostics.

These innovations could deliver far-reaching benefits – nearly 19 million people live with dementia across the OECD – but they also pose risks. As neurotechnologies continue to evolve, concerns have been raised around privacy, human enhancement and the regulation and marketing of direct-to-consumer devices. There are also important questions around inequalities of use and access to these technologies.

Amid this rapidly shifting landscape, governments and innovators have sought guidance on how to foster responsible innovation in neurotechnology. How can we continue to reap the benefits of these innovations, while mitigating the new risks that they present?

Governance in neurotechnology has implications across the entire innovation pipeline, from fundamental brain research and cognitive neuroscience to questions of commercialisation and marketing.

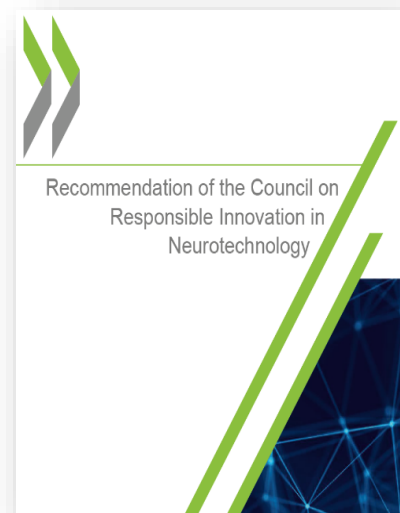
At the core of the OECD Recommendation are nine principles:

- Promote responsible innovation
- Prioritise safety assessment
- Promote inclusivity
- Foster scientific collaboration
- Enable societal deliberation
- Enable capacity of oversight and advisory bodies
- Safeguard personal brain data and other information
- Promote cultures of stewardship and trust across the public and private sector
- Anticipate and monitor potential unintended use and/or misuse.

The Recommendation marks an important step forward for the 36 OECD member countries that have adopted it and the others that will soon join. Governance in neurotechnology has implications across the entire innovation pipeline, from fundamental brain research and cognitive neuroscience to questions of commercialisation and marketing. To that end, the Recommendation is aimed not only at governments, but also universities, companies and investors – all of whom play a key role in ensuring the responsible development and governance of neurotechnologies. As countries continue to accelerate investment in this field through programs such as the EU Human Brain Project, the Recommendation and the principles it outlines should help them to put societal needs front and centre.

The Recommendation is more than an ethics statement: it also addresses economic development and innovation policy. In many ways, it can be seen as a companion to the OECD AI Principles adopted earlier this year as they both underscore the importance of innovating in a socially responsible matter – innovating for innovation's sake is no longer enough. And, like AI, neurotechnology is a broad field with implications for sectors as diverse as gaming and advertising. The OECD Recommendation focuses on health-related neurotechnology because of its outsize potential to advance our understanding of human cognition and behaviour.

Going forward, the OECD will provide a forum for exchanging information on neurotechnology policy and experiences as countries work toward implementing the Recommendation. This kind of multilateral co-operation and dialogue will be crucial as neurotechnology continues to disrupt existing practices and redraw traditional boundaries between medical therapies and consumer markets.



Recent Publications:

- 📖 Garden, H. et al. (2019), "Responsible innovation in neurotechnology enterprises", OECD Science, Technology and Industry Working Papers, No. 2019/05, OECD Publishing, Paris, <https://doi.org/10.1787/9685e4fd-en>.
- 📖 Garden, H. and D. Winickoff (2018), "Issues in neurotechnology governance", OECD Science, Technology and Industry Working Papers, No. 2018/11, OECD Publishing, Paris, <http://dx.doi.org/10.1787/c3256cc6-en>.

Contact: Hermann Garden (STI/STP)

The case of genomics and biobanks



BNCT undertakes a project on "Collaborative Platforms for Converging Technologies".

Novel approaches to advancing personalised, genomics-based medicine are being built into research initiatives, health systems, and markets. Data-driven innovation and artificial intelligence (AI)-systems offer the potential to better understand the role of genetic factors in health and well-being, and to deliver more efficient therapies and diagnostics. Genomic and other omics data, biobanks, as well as medical, social, behavioural and family histories, form the basis for recent advances in deep phenotyping – a more precise and comprehensive analysis of 'big' molecular, biological and health-related data

and individual phenotypic characteristics (i.e. the expression of genes in an observable way).

Government funding and cross-sectoral collaboration, for example through public-private partnerships (PPPs) have been key drivers for the translation of shared assets and common-pool resources such as genomic, neurological, and phenotypic data as well as collections of bio-specimens into clinical practice.

National and international biobanks and genomic initiatives are at the heart of the development and use of personalised medicine. Co-creative processes across public and private actors are supporting transformative change in research and health-care while simultaneously addressing issues around implementation, sustainability, and wider adoption. Key factors for successful collaboration are, for example: the need for all to be aligned on what should be achieved and how; clearly defined roles and active involvement of all parties; the importance of recognition of the contributions of all parties to a collaboration.

Although biobanks and assemblages of health data have become institutionalised in many countries for some years, these platforms are currently experiencing a wave of new policy challenges related to technological and institutional change. The steady increase of computational power as well as new kinds of machine learning are opening new scientific models around even greater assemblages of diverse personal data. Platforms that can collect and organise large amounts of data have taken on greater scientific and economic value. Meanwhile, the push towards greater international linkage has resulted in new forms of institutional collaboration.

It is against this backdrop that the Working Party on Biotechnology, Nanotechnology and Converging Technologies (BNCT) convened a workshop "Collaborative platforms for personalised health: realising the potential of genomics and biobanks", 17-18 September 2019, at Vinnova, Swedish Governmental Agency for Innovation Systems, Stockholm, Sweden. The workshop brought together policy makers, experts in business models, intellectual property (IP), data sharing, open science, and in the ethical, legal, and social implications (ELSI) of genomic innovation from 21 countries. Specifically, the goal of the workshop was to re-examine the institutional arrangements and business models underlying collaborative platforms in genomics and biobanks for personalised health.

Contact: Hermann Garden (STI/STP)



SUSTAINABLE BIOECONOMY

The Working Party on Bio-, Nano-, and Converging Technology has a work stream devoted to innovation for a sustainable bioeconomy, where industrial biotechnology plays an important role. Currently, there are three areas of focus:

1. Biotechnology and engineering biology in the bioeconomy. From the start of this decade there has been increasingly less focus on biotechnology in the bioeconomy as other issues have emerged. The focus in this biennium is on bridging the gap between many research successes and few commercialisations of bio-based chemicals and materials. The answers lie in greater automation to make engineering biology more reliable and reproducible.
2. Review of the Council Recommendation on Assessment of the Sustainability of Bio-Based Products.
3. A Biorefineries Roadmap for Thailand.

Recent publications and papers:

- Philp, J.C. and R.M. Atlas (2020), "Bioremediation, edition 3", in: Electronic Encyclopaedia of the Life Sciences, Nature Publishing Group, London.
- Philp, J.C. (2019/2020), "Bio-based chemicals and sustainability", Wiley Encyclopedia of Water.
- OECD (2019), "Innovation ecosystems in the bioeconomy", OECD Science, Technology and Industry Policy Papers, No. 76, OECD Publishing, Paris.
- OECD (2019), "Policy initiatives for health and the bioeconomy", OECD Science, Technology and Industry Policy Papers, No. 83, OECD Publishing, Paris.
- OECD (2019), "Policy initiatives for health and the bioeconomy - Case studies", <https://community.oecd.org/docs/DOC-161274>.
- OECD Observer (2019), "Why Finland's running circles round us", OECD Observer, Finland 50th Anniversary edition 2019, May 22, 2019, http://oecdobserver.org/news/fullstory.php/aid/6155/Why_Finland_92s_running_circles_around_us.html.
- OECD (2019), "Digitalisation in the bioeconomy: Convergence for the bio-based industries. Chapter 6", in: The digitalisation of science, technology and innovation: key developments and policies.
- Kitney, R. et al. (2019), "Enabling the advanced bioeconomy with engineering biology", Trends in Biotechnology, No. 37, pp. 917-920.
- Bioengineers to standardise biomanufacturing. European Biotechnology, April 13, 2019, <https://european-biotechnology.com/up-to-date/backgrounds-stories/story/bioengineers-to-standardise-biomanufacturing.html>.

Contact: Jim Philp (STI/STP)

Upcoming events:

- 12th Meeting of the Working Party on Biotechnology, Nanotechnology and Converging Technologies (BNCT), 14-16 December 2020
- 13th Meeting of the Working Party on Biotechnology, Nanotechnology and Converging Technologies (BNCT), 5-7 May 2021
- 14th Meeting of the Working Party on Biotechnology, Nanotechnology and Converging Technologies (BNCT), 8-9 December 2021

BIOTECHNOLOGY STATISTICS

The OECD Key Biotech Indicators (KBI) and the OECD Key Nanotech Indicators (KNI) were updated in October 2019. Time series are presented for a select number of indicators. Visit the websites to see the latest Tableau visualisations!

The KBI are available at: oe.cd/kbi and the KNI data are available at: oe.cd/kni.

Contact: Brigitte van Beuzekom (STI/EAS)

BIOENERGY AND BIOFUELS AT TRADE AND AGRICULTURE DIRECTORATE

The subject of bioenergy touches various areas, in particular, scientific developments, environmental effects, energy balances and agricultural market economics. The Trade and Agriculture Directorate (TAD) work on bioenergy focuses on a comprehensive compilation of data and information, the categorisation of the variety of support policies and the quantitative analysis of bioenergy markets and policy measures.

An economic assessment of biofuel support policies, published in 2008, concluded that government support of biofuel production in OECD countries was costly, with a limited impact on reducing greenhouse gases and improving energy security, however with a significant impact on world crop prices. The study highlighted that other forms of bioenergy, such as bioheat, biopower and biogas, could represent economically more viable and environmentally more efficient ways to reduce GHG. Another publication presented the technology and costs associated with the bioheat, biopower production as well as second generation biofuels. An OECD study published in 2010 focused on the development and the environmental performance of those alternative forms of energy. They are mostly generated with non-agricultural feedstocks and, to a lesser extent, agricultural residues and wastes. Main technologies to convert biomass to heat and/or electrical power include the direct combustion, the gasification and the anaerobic digestion producing biogas. Combined heat and power generation plants allow improving the energy efficiency with the use of the remaining heat after power generation for space heating or in industrial applications.

The OECD-FAO Agricultural Outlook annual report covers biofuel market and related policy developments. The 2019 Agricultural Outlook (projecting on the 2019-2028 period) is available at <http://www.agri-outlook.org/>, see 'Biofuels' chapter (OECD/FAO, 2019).

TAD has created a detailed database of policies in the fertiliser and biofuel sectors of OECD countries and several Emerging Economies available at <http://www.oecd.org/tad/agricultural-policies/support-policies-fertilisers-biofuels.htm>. An analysis of these policies and their implications for agricultural markets and incomes has been published within the Food, Agriculture and Fisheries Paper series (von Lampe et al., 2014). A previous Trade and Environment Working Paper has focused on domestic incentive measures for renewable energy with possible trade implications (Bahar, Egeland and Steenblick, 2013).

TAD participates in the Agricultural Market Information System (AMIS) project (www.amis-outlook.org). One of TAD's contributions to AMIS is to report each month on newly implemented biofuel policies in the AMIS countries in the Market Monitor Report. In addition, TAD has developed a large policy database including biofuel policies (<http://statistics.amis-outlook.org/policy/>).



The OECD and the IEA currently collaborate in an analysis of the costs and prospects associated to current and emerging biofuel supply pathways.

Recent Publication:

📖 OECD/FAO (2019), OECD-FAO Agricultural Outlook 2019-2028 – “Biofuels” chapter, full document available at: <http://www.agri-outlook.org/>.

Website: <http://www.oecd.org/tad/agricultural-trade/bioenergy.htm>
AMIS Market Monitor Report: <http://www.amis-outlook.org/amis-monitoring/monthly-report/en/>
AMIS biofuel policies database: <http://statistics.amis-outlook.org/policy/>

Contacts: Annelies Deuss (TAD/ATM), Tatsuji Koizumi (TAD/ATM), Martin Von Lampe (TAD/PTA)



BIOENERGY AT THE IEA

The activities of the International Energy Agency (IEA) cover bioenergy across the electricity, heat and transport sectors.

In May 2020, the IEA published a [Renewable Energy Market Update](#) providing an analysis of the impacts of the Covid-19 crisis on renewable electricity capacity additions for all technologies (including biomass for power) and transport biofuel production over 2020 and 2021.

In March 2020, the IEA published an [Outlook for biogas and biomethane](#). This report gives estimates of the sustainable potential for biogas and biomethane supply, based on a detailed assessment of feedstock availability and production costs across all regions of the world. These form the basis on an outlook for biogas and biomethane supply and demand up to 2040, based on the scenarios presented in the annual World Energy Outlook.

The IEA's updated Tracking Clean Energy Progress (TCEP) analysis comparing current market trends with the needs of the IEA's Sustainable Development Scenario (SDS) was published in May 2020. This contains analysis on bioenergy for power and transport biofuels: <https://www.iea.org/tcep/>.

Under the framework of the [Biofuture Platform](#) (BfP), a group of 20 countries seeking to accelerate transition to sustainable bioeconomy, the IEA in its capacity of Facilitator is supporting strategic discussions and exchange of information among members about recent developments in bioenergy policies and markets, particularly following on the Covid-19 global pandemic.



On 3 June 2020, the IEA brought together BfP government representatives and leaders from the bioenergy industry under the umbrella of the IEA Renewable Energy Industry Advisory Board (RIAB) to share their views regarding how bioenergy can play a key role in supporting Covid-19 recovery packages by creating jobs and lowering CO2 emissions. This lively discussion brought up insightful views about what they see as the most promising applications and technologies, market drivers and barriers, and the support needed to accelerate their deployment

Each year the RED publishes a [renewable energy market report](#), last year's version 'Renewables 2019' included forecast for biomass electricity, transport biofuel production and an outlook for bioenergy in the heat sector. The 2018 version of the report had a key focus on bioenergy, further information available: [here](#).

Recent publication:

📖 IEA (2020), Renewable Energy Market Update, <https://www.iea.org/reports/renewable-energy-market-update>

Website: <http://www.iea.org/topics/renewables/>
<https://www.iea.org/renewables2018/>

AGRICULTURAL INNOVATION SYSTEMS

Innovation within the global food and agriculture system is needed to increase productivity growth and sustainability. OECD work in this area analyses developments in agricultural innovation systems and the role of the government in fostering innovation in food and agriculture.

The OECD Trade and Agriculture Directorate (TAD) first considered the role of agricultural innovation in increasing productivity. It also analysed developments in farm productivity and agricultural innovation systems (AKS) and the impact of related policies. A Conference on AKS in 2011 explored how to foster the development and adoption of innovation in order to meet global food security and climate change challenges. Many countries and international organisations stated that status quo was not an option and that greater efforts were required to create an effective and responsive environment for innovation. The potential role of biotechnologies in increasing productivity and facilitating adaptation to climate change was also recognised.

In 2013, an OECD report on the role of the government in fostering innovation in the agri-food sector suggested [a framework](#) for analysing a wide range of policies that affect agricultural innovation. Applied to three pilot country reviews published in 2015 (Australia, Brazil and Canada), the framework was then revised to include the impact of policies on other drivers of productivity growth and sustainability, such as structural change, sustainable resource use and climate change. This productivity-sustainability framework was used in a number of country reviews: the Netherlands (2015), Turkey and the United States (2016), P.R. China, Estonia, Korea and Sweden (2018), and Japan and Latvia (2019). The review of Viet Nam is expected to be completed early 2021. A further revised framework incorporating resilience in addition to productivity and sustainability, and making some policy areas more visible became available in February 2020 [[TAD/CA/APM/WP\(2019\)25/FINAL](#)]. This Productivity-Sustainability-Resilience framework is being used for the review of policies in Norway, expected to be completed at the end of 2020.

The main findings and policy recommendations from the country reviews achieved since 2015 were published in 2019 (OECD, 2019). A booklet containing an [overview of the main findings](#) and a [policy brief](#) were made available at an OECD seminar organised on 11 May 2019 before the G20 Meeting of Agricultural Ministers in Niigata, Japan.

A report on best practice to ensure successful public-private partnerships (PPP) for agricultural innovation, published in 2016 (Moreddu, 2016), drew on discussion at the Food Chain Analysis Network on, organised with Business at OECD (BIAC) in 2014 ([more information online](#)).

A series of reports investigating the dynamics and determinants of farm productivity and sustainability performance, including innovation and agricultural policies, has been published in the OECD Food, Agriculture and Fisheries Paper series (Kimura and Sauer, 2015; Sauer, 2017; Bokusheva, and Čechura, 2017; Sauer and Moreddu, 2020). Further work investigates the dynamics of farm performance and the effect of policies.

A workshop on innovations in food and agriculture: Policies to foster productive and sustainable solutions was organised in February 2016 with the Directorate for Science, Technology and Innovation. It included sessions on the bioeconomy, big data and international collaboration. The summary record of the workshop is available on-line (OECD, 2016).

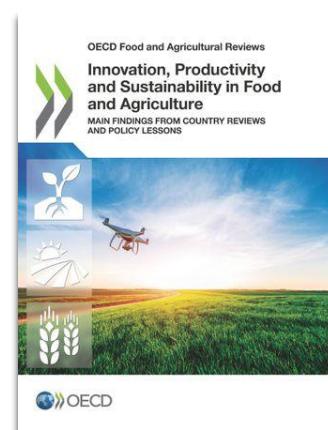


Recent publications:

- 📖 Sauer, J. and C. Moreddu (2020), "Drivers of farm performance: Empirical country case studies", OECD Food, Agriculture and Fisheries Papers, No. 143, OECD Publishing, Paris, <https://doi.org/10.1787/248380e9-en>.
- 📖 OECD (2019), Innovation, Productivity and Sustainability in Food and Agriculture: Main Findings from Country Reviews and Policy Lessons, OECD Food and Agricultural Reviews, <https://doi.org/10.1787/c9c4ec1d-en>.

Website: <http://www.oecd.org/agriculture/topics/agricultural-productivity-and-innovation/>

Contact: Jonathan Brooks (TAD/ARP)



AGRICULTURAL SEED AND FOREST REPRODUCTIVE MATERIAL CERTIFICATION SCHEMES

The following three criteria; distinctness, uniformity and stability are used for defining crop varieties and form the basis for agricultural seed development and trade. Identification and minimum purity criteria are important components of sustainability, especially in the case of hybridisation and genetic modifications. For forest reproductive material reliability depends on several factors including identification of origin (region or provenance), selection and breeding.

The OECD Seed Schemes, established in 1958, are a set of international standards for field inspection and certification of the most important agricultural and vegetable species. The Schemes aim to harmonise seed certification; thereby facilitating and promoting international seed trade. The eight Seed Schemes establish rules and standards for varietal inspection and certification of seeds from OECD listed varieties. Sixty-one countries are currently a member of at least one of the Schemes.

The List of Varieties Eligible for OECD Certification covers 204 species – including all major crops – and more than 62 000 varieties. OECD statistics indicate that the total weight of OECD certified seeds traded corresponded to 1.2 billion kg in 2016. The electronic database provides an online search facility for OECD listed varieties and is available from the official website (see below).

In order to assess the current and future needs of international certification, the OECD Seed Schemes have established a number of Ad-Hoc Working Groups and holds regular discussions with their Technical Working Group to examine issues, explore new opportunities and develop new procedures. One of the key issues for the OECD Seed Schemes is the emerging role of biochemical and molecular techniques (BMT) in describing and identifying varieties. This is a rapidly developing field with more and more DNA based techniques available.

International organisations such as OECD, International Union for the Protection of New Varieties of Plants (UPOV) and International Seed testing Association (ISTA) need to pursue these new techniques carefully in order to maintain the integrity of the seed sectors international regulatory framework. A joint OECD-UPOV-ISTA Workshop on BMTs took place in June 2019. Participants discussed the development of a joint document explaining current activities related to BMT, including an inventory molecular marker techniques and a list of terms and their definitions as used by the three Organisations.

The OECD Forest Seed and Plant Scheme encourages the production and use of forest reproductive material that has been collected, processed and marketed in a manner that ensures their trueness to name. It is currently implemented in 28 countries. The Scheme's rules were recently completed by including the "Tested" category and new types of basic materials, such as clones, clonal mixture and parents of families. Moreover, the Scheme is now adapted to deal with multifunctional forest trees.



The Scheme is exploring possible ways to adapt to and mitigate climate change. The scheme is collaborating with organisations such as Kew Gardens, to better understand and communicate the importance of the origin of forest reproductive material in afforestation reforestation and in forest tree plantations. The certification of origin is becoming more and more important as it provides information to foresters on the adaptation potential of the forest reproductive material. Some countries have introduced DNA-based control systems to check the true origin (region of provenance) of the imported forest tree seeds, parts of plants or plants.

Advanced forest reproductive materials such as clones are playing an increasingly important role in certain parts of the forestry sector and therefore registration of this type of basic material has increased significantly. However, the certification of forest clonal material is becoming increasingly challenging for National Designated Authorities (NDAs) and BMTs may play a key role in their certification in the future.

Upcoming events:

Agricultural Seed Schemes:

- Annual Meeting of National Designated Authorities: 15-19 June 2020 (virtual)
- Ad Hoc WG meetings: 26-28 January 2021, OECD Paris
- Annual Meeting of National Designated Authorities: 9-11 June 2021, OECD Paris

Forest Seed and Plant Scheme:

- Annual Meeting of the National Designated Authorities: 29-30 September 2020 (virtual)
- Annual Meeting of the National Designated Authorities: 5-6 October 2021, OECD Paris

Recent publications:

- 📖 [OECD Seed Schemes: Rules and regulations](#); 2019 edition
[fr.]: [Systèmes des semences de l'OCDE](#) : Règles et directives ; édition 2019
- 📖 [List of Varieties Eligible for Seed Certification](#); January 2020
- 📖 [OECD Forest Seed and Plant Scheme "2019" \(Rules and Regulations\)](#)
[fr.]: [Système de l'OCDE pour les semences et plants forestiers](#) "2019" (Règles et Directives)

Web sites: <https://www.oecd.org/agriculture/seeds/>
<https://www.oecd.org/agriculture/forest/>

Promotional video on the OECD Forest Scheme: <https://youtu.be/nqGXYz5Sln4>.

Contact: Csaba Gaspar (TAD/COD)



CO-OPERATIVE RESEARCH PROGRAMME: BIOLOGICAL RESOURCE MANAGEMENT FOR SUSTAINABLE AGRICULTURAL SYSTEMS

The OECD Co-operative Research Programme (CRP), which gathers 25 OECD countries, is based on the observation that multi-disciplinary agri-food research is needed to address the gaps in knowledge, deepen understanding and enhance the scientific base of policy. The objectives of the CRP are the following: to provide a sound scientific knowledge base to agricultural policy-making; to contribute to an informed public debate on current and emerging agro-food issues and help resolve conflicting views; and to promote scientific understanding and standards between major regions of OECD.

Operational features of the Programme involve supporting and promoting international co-operation and networking in the field of basic and applied research. It awards fellowships to scientists from a CRP member country to conduct research projects in another CRP member country, and supports financially workshops

to address agro-food issues that are high on the science/policy agenda of Members. The CRP strategy emphasises the need to engage a range of scientific disciplines including the natural sciences, social sciences and the humanities in an interactive dialogue. Three themes will be addressed by the Programme during its mandate period (2016-2020): 1) Managing Natural Capital for the Future; 2) Managing Risks in a Connected World; and 3) Transformational Technologies and Innovation.

The call for applications for funding of international conferences and fellowships (individual research projects) in 2021 is open until midnight (Paris time) of 10 September 2020. Information about the fellowships and conferences and workshops which should be funded in 2020 are on the CRP website (www.oecd.org/agriculture/crp); however, given the current world situation with the COVID-19 pandemic, most of the events due to take place in 2020 are postponed until 2021.

Conferences due to be (co-)sponsored by the Programme in 2020

- Development of standard research methodologies for the mass rearing of insects fed waste organic residues for the production of novel animal feeds. A workshop within the 3rd International conference: Insects to Feed the World 2020, Quebec, Canada (postponed until 2021)
- International symposium on "Adaptations to climate change in the food system: enhancing synergies and breaking trade-offs between adaptation, mitigation, and ecosystem services", Tsukuba, Japan (postponed until 2021)
- Governing Nutrient Pollution Beyond Farmers, New York, USA (postponed until 2021)
- New Futures for Satoyama and SEPLs - innovation in policy and practice to sustain cultural landscapes, Cirencester, United Kingdom (postponed until 2021)
- International Workshop "Food security: managing risks in a connected world", Santiago, Chile (likely to be postponed until 2021)
- Water use assessment of livestock production systems and supply chains, Berlin, Germany (postponed until 2021)
- Ecosystem Based Fisheries Management (EBFM) in lobster and crab fisheries, Freemantle, Australia (postponed until 2021)
- Grazing in Future Multi-Scapes: From thoughts to landscapes, creating health from the ground up, Lincoln, New Zealand (postponed until 2021)

Conferences (Co-)sponsored by the Programme in 2019

Feedback on two outstanding 2019-sponsored conferences:

- 4th International Workshop on *Streptococcus suis*, Montreal, Canada, 3-4 June 2019

Streptococcus suis infections represent a growing problem for the pig industry, causing economic losses to pig farmers and outbreaks in humans. The ability to control these infections rely on the use of antibiotics and on autogenous vaccines, but both of these approaches are of limited efficacy; autogenous vaccines can protect against the strain of *Streptococcus suis* for which the vaccine was developed, but have limited or no effect on other strains. Overuse of antibiotics is a concern; there is a clear increase in the detection of resistant *Streptococcus suis* isolates. The conference called for the harmonisation of the regulatory framework for antibiotic use and for a regulatory framework for autogenous vaccines.
- Intellectual Property and Access to CRISPR-Cas Gene Editing Technologies for Innovation in Crop Agriculture, Keystone, Colorado, US, 17-18 October 2019

This meeting explored the central role of intellectual property (IP) control and access on innovation in agricultural biotechnology, especially regarding the highly promising gene editing (CRISPR) techniques. The meeting uniquely brought together two sets of issues, whose confluence carries major implications for agricultural policy: first, in a synthetic view, intellectual property and regulation as co-factors in gene editing innovation; second, the relation between intellectual property and public acceptance. This kind of synthesis across issues and disciplines accounts for the unique value of the meeting for practitioners, policy makers, and academics alike. Further, the improved understanding of the major factors in agro biotechnology innovation carry lessons for gene editing policy in other areas of innovation. Finally, the meeting identified the OECD as an ideal forum for tackling the difficult problems of divergence and fragmentation across national regulatory contexts for gene editing.

CRP Fellowship Awards in 2020:

Examples of the topics of some of the 2020 fellowships are given below. Given the current situation due to the pandemic, many of the 2020 fellowships are postponed to 2021.

- Understanding the mechanisms involved in epigenetic variability and inheritance in plants
- Epigenetic markers of fish domestication for selective breeding

- Investigating next-generation sequencing technology as a standard diagnostic tool for grapevine trunk disease fungal pathogens
- Mining orchard yeast diversity for novel horticultural biocontrol agents
- Deep-sequencing and bioinformatics approaches to support norovirus illness outbreak investigations
- Characterisation of environmental calcium content as predictor of disease severity by the emergent plant pathogen *Xylella fastidiosa*
- Potential risk of commonly used neonicotinoids: tools for evaluating the environmental exposure and contamination levels in agroecosystems
- Development of novel technologies in integrated biting fly management via understanding physiological mechanisms of spatial and contact repellency
- Nematode trait-based indicators of climate change in semi-arid agricultural systems
- Development of advanced in vitro protocols for plant biodiversity conservation

CRP Fellowship Awards in 2019

Examples of the topics dealt by some of the fellowships completed in 2019:

- Sustainable management of natural resources using multi-source remote sensing data and enhanced software solutions

This research project aimed to enhance remote-based forest inventory methods based on airborne laser scanning (ALS) and synthetic aperture radar (SAR), sensors which have been recognised as valuable tools for mapping and inventorying forest ecosystems. The researchers developed a core for algorithms using ALS and SAR data with an area-based approach to estimate forest states and changes on various spatial levels; this information is essential to assess the total and annual capacity of forest vigour and deforestation, as well as for studying productivity, carbon cycles, nutrient allocations and fuel accumulation in terrestrial ecosystems. A case study conducted during the fellowship provides key information about ALS and SAR, methods for combining data from both technologies to achieve accuracy in estimating standing volume. The results from the project include new skills and tools for remote-based forest inventory that are easy to use, applicable for different conditions and users, usable at the local, regional and national levels and time and cost saving. The information from the research project should inform future policy decisions related to the sustainable use of natural resources in forest ecosystems.

- Enhanced aquafeed production: improving growth and feed quality of microalgal cultures and biofloc

This research project looked at using microalgae as a feed source for aquaculture to reduce the current reliance on fishmeal produced from capture fisheries. Capture fisheries, such as anchovies, herring or sardines, provide high quality protein and oils for fishmeal, but wild fish stocks are increasingly overfished. Land-based crops such as corn or soy are used for some fishmeal, but cannot completely replace fish oils. Alternatives therefore need to be found. Algal biomass can be produced near to the point of use, requiring considerably less energy and landmass than corn or soy based fishmeal and thereby keeping agriculturally valuable land in crop production directly for human food. By choosing the right species of algae, cultivation conditions and media for production, the nutrient content can be manipulated to resemble the nutrient balance of natural fishmeal. The researchers found that there is considerable promise in feeds from microalgal production that depend only on primary producers (i.e. sunlight for energy) or only recycled nutrients from biowaste to develop single-cell feeds that are closer to microbial relationships and evolutionary feed preferences of natural marine and aquatic environments.

- Regenerative agriculture – transforming food systems by coupling grassroots innovation with scientific understanding

The objectives of this research project were to appraise the benefits offered by regenerative agriculture on a range of ecosystem services and to identify potential pathways or barriers for working collaboratively between regenerative agricultural academics and policy makers to promote regenerative agriculture. Given the rising interest in regenerative agriculture worldwide, contrasted with the current lack of clarity on its effectiveness, this project contributes to providing fact-based information to depolarise the current on-going opinion-based, polemic debate on the suitability of regenerative agriculture for regenerating landscapes, communities and bio-economies, whilst producing high nutritious food products. Particular attention was given during the fellowship study on the suitability of regenerative practices for food production in water-sensitive areas, either due to scarce / irregular water supply, or sensitive watersheds threatened by agricultural activities. The project also looked at multiple and varied case-studies of socio-ecological innovation on-the-ground, and the extent to which these innovations relied on academic research or were mostly decoupled from it. The researchers found that multiple models occurred, and that these models were people- and context- specific. The findings urge policy makers to embrace local specificity and diversity of solutions put forward for solving the current global food crisis associated with climate change – one-size-fit-all solutions are more easily implemented, but not necessarily viable or relevant everywhere.

Summary reports submitted by the individual research fellows are posted on the CRP website www.oecd.org/agriculture/crp as they become available.

Note: The call for applications for the submission of applications for 2021 research fellowship awards and conference sponsorship is open until **10 September 2020**.

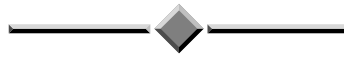
All relevant information and application forms will be available on the CRP website, through the link: www.oecd.org/agriculture/crp.

Recent publications and papers:

- 📖 Breiling, M. and V. Anbumozhi (Eds.) (2020), Vulnerability of Agricultural Production Networks and Global Food Value Chains due to Natural Disasters, Economic Research Institute for ASEAN and East Asia (ERIA), https://www.eria.org/uploads/media/Books/2020-Jan/Vulnerability-of-Agricultural-Production-Networks_Full-Report.pdf
- 📖 Sanchez-Hernandez, J.C., Y. Capowiez and K.S. Ro (2020), "Potential Use of Earthworms to Enhance Decaying of Biodegradable Plastics", ACS Sustainable Chemical Engineering, Vol. 8, No. 11, pp. 4292-4316, American Chemical Society (ACS) Publications, <https://doi.org/10.1021/acssuschemeng.9b05450>
- 📖 Sačkov, I., L. Kulla and T. Bucha (2019), "A Comparison of Two Tree Detection Methods for Estimation of Forest Stand and Ecological Variables from Airborne LiDAR Data in Central European Forests", Remote Sensing, Vol. 11, pp. 1431, MDPI Journals, <https://doi.org/10.3390/rs11121431>
- 📖 Hemming, E.B., M. Selva et al. (2019), "Single-Step Methylation of Chitosan Using Dimethyl Carbonate as a Green Methylating Agent", Molecules, Vol. 24, No. 21, pp. 3986, MDPI Journals, <https://doi.org/10.3390/molecules24213986>
- 📖 Sanchez-Hernandez, K., S. Ro and F.J. Diaz (2019), "Biochar and earthworms working in tandem: Research opportunities for soil bioremediation", Science of the Total Environment, Vol. 688, pp 574-583, Elsevier, <https://doi.org/10.1016/j.scitotenv.2019.06.212>

Website: www.oecd.org/agriculture/crp

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COMING OECD EVENTS FROM JUNE 2020

15-19 June 2020	"Agricultural Seed Schemes: Annual Meeting of the National Designated Authorities", virtual (Contact: C. Gaspar, TAD/COD)
29-30 September 2020	"Forest Seed and Plant Scheme: Annual Meeting of the National Designated Authorities", virtual (Contact: C. Gaspar, TAD/COD)
26-28 October 2020	"50 th session of the Joint Working Party on Agriculture and the Environment", OECD Paris (Contact: D. Diakosavvas, TAD/ARP)
25-26 November 2020	"GGSD Forum on Securing Natural Capital: Resilience, risk management and Covid-19", (Contact: K. Kitamori, E. Botta, ENV/GGGR)
14-16 December 2020	"12 th Meeting of the Working Party on Biotechnology, Nanotechnology and Converging Technologies (BNCT)" (Contact: H. Garden, J. Philp, D. Winikoff, STI/STP)
26-28 January 2021	"Agricultural Seed Schemes: Ad-Hoc WG meetings", OECD Paris (Contact: C. Gaspar, TAD/COD)
1-3 March 2021	"35 th Meeting of the Working Party on the Harmonisation of Regulatory Oversight in Biotechnology", OECD Paris (contact: R. Oshima, B. Dagallier, N. Komoto, ENV/EHS)
3-5 March 2021	"28 th Meeting of the Working Party for the Safety of Novel Foods & Feeds", OECD Paris (contact: B. Dagallier, N. Komoto, R. Oshima, ENV/EHS)
5-7 May 2021	"13 rd Meeting of the Working Party on Biotechnology, Nanotechnology and Converging Technologies (BNCT)" (Contact: H. Garden, J. Philp, D. Winikoff, STI/STP)
9-11 June 2021	"Agricultural Seed Schemes: Annual Meeting of National Designated Authorities", OECD Paris (Contact: C. Gaspar, TAD/COD)
5-6 October 2021	"Forest Seed and Plant Schemes: Annual Meeting of National Designated Authorities", OECD Paris (Contact: C. Gaspar, TAD/COD)
8-9 December 2021	"14 th Meeting of the Working Party on Biotechnology, Nanotechnology and Converging Technologies (BNCT)" (Contact: H. Garden, J. Philp, D. Winikoff, STI/STP)



OECD BIOTECHNOLOGY AND THE WORLD WIDE WEB

OECD's web site includes much information on biotechnology and related topics. The web site allows individual users to tailor the OECD site to their needs. By selecting the themes that interest them, visitors can personalise their homepages at My OECD to present the news, events, and documentation related to their chosen themes. Links to more detailed web pages are given in related sections above.

Visitors can also choose to receive automatically future editions of Biotechnology Update through "My OECD".

- OECD's portal: www.oecd.org
- OECD's work on green growth: www.oecd.org/greengrowth (Eng.)
www.oecd.org/croissanceverte (Fr.)
- OECD's global fora portal: <http://www.oecd.org/global-relations/globalforums/> (Eng.)
www.oecd.org/fr/relations-mondiales/forumsmondiaux (Fr.)
- OECD's work on biosafety and food/feed safety for transgenic products, "BioTrack" Online: www.oecd.org/biotrack
- OECD's transgenic plant products database: <https://biotrackproductdatabase.oecd.org>
- OECD Conference on Genome Editing (June 2018): <http://www.oecd.org/environment/genome-editing-agriculture/>
- OECD Conference on dsRNA-based Products (April 2019):
<http://www.oecd.org/chemicalsafety/pesticides-biocides/conference-on-rnai-based-pesticides.htm>
- OECD's work on biodiversity: www.oecd.org/environment/resources/biodiversity/
- OECD STI's emerging technologies; biotechnology, nanotechnology and converging technologies (BNCT):
www.oecd.org/sti/emerging-tech
- OECD's key biotechnology indicators (KBI): oe.cd/kbi
OECD's key nanotech indicators (KNI): oe.cd/kni
- OECD TAD's work on bioenergy: <http://www.oecd.org/tad/agricultural-trade/bioenergy.htm>
- AMIS biofuel policies database: <http://statistics.amis-outlook.org/policy/>
- International Energy Agency (IEA) work on renewable energy: <http://www.iea.org/topics/renewables/>
- Biofuture Platform (BfP), IEA facilitator: <http://biofutureplatform.org/>
- OECD's work on agricultural innovation systems:
www.oecd.org/agriculture/topics/agricultural-productivity-and-innovation
- OECD's seed certification schemes (agriculture, forest): <http://www.oecd.org/agriculture/seeds>
<http://www.oecd.org/agriculture/forest>
- OECD's Cooperative Research Programme on Biological Resources in Agriculture: www.oecd.org/agriculture/crp



WHO'S WHO IN BIOTECH AT OECD?

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**ENDNOTE: A BRIEF GUIDE TO THE OECD**

The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organisation with 37 member countries². The mission of the OECD is to promote policies that will improve the economic and social well-being of people around the world. OECD brings together the governments of countries committed to democracy and the market economy to support economic growth, boost employment, raise living standards, maintain financial stability, assist other countries' economic development, and contribute to growth in world trade.

The Organisation provides a setting where governments compare policy experiences, seek answers to common problems, and identify better policies for better lives. An increasing number of non-member economies participate in a wide range of activities, including some of those related to biotechnology.

The Council of OECD is the highest decision-making body of the Organisation. Its members are the Ambassadors of the Member countries to OECD. It is chaired by OECD's Secretary-General. Once a year, it also meets at the level of Ministers from member countries. The Council decides on the annual budget of Organisation as well as the content of the programme of work.

In addition to the Council, there are more than 300 committees, expert and working groups, which undertake the Organisation's programme of work. The governments of the Member countries nominate the participants to all these groups.

² OECD member countries are: Australia, Austria, Belgium, Canada, Chile, Colombia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission also takes part in the work of the OECD.

The list below shows the main OECD bodies that have activities related to biotechnology:

OECD COUNCIL

Green Growth Strategy

Innovation Strategy

Global Forum on Biotechnology

Committee for Scientific and Technological Policy (CSTP)

- Working Party on Biotechnology, Nanotechnology and Converging Technologies (BNCT)
- Working Party of National Experts on Science and Technology Indicators

Committee for Agriculture (COAG)

- Working Party on Agricultural Policies and Markets (APM)
- Co-operative Research Programme
- Research Programme on Bioenergy (Trade and Agriculture Directorate,
in collaboration with the International Energy Agency)
- Seed Certification Schemes (agriculture, forest)

Joint Working Party on Agriculture and the Environment (JWPAE)

Environment Policy Committee (EPOC)

- Working Party on Biodiversity, Water and Ecosystems (WPBWE)
- Working Party on Climate, Investment and Development (WPCID)

Chemicals Committee and Working Party on Chemicals, Pesticides and Biotechnology (Joint Meeting)

- Working Group on the Harmonisation of Regulatory Oversight in Biotechnology (WG-HROB)
- Working Group for the Safety of Novel Foods and Feeds (WG-SNFF)



Internal Co-ordination Group for Biotechnology