



PROJECT NEWSLETTERS

Deliverable 8.4 – WP8

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OPTIMISING BIO-BASED FERTILISERS IN AGRICULTURE – PROVIDING A KNOWLEDGE BASIS FOR NEW POLICIES

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Dec	Websites, patents, filling etc.		
Dem	Demonstrator		
O	Other		

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CO	Confidential, only for members of the consortium (including the Commission Services)		



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LEX4BIO aims to reduce the dependence upon mineral/fossil fertilisers, benefiting the environment and the EU's economy. The project will focus on collecting and processing regional nutrient stock, flow, surplus and deficiency data, and reviewing and assessing the required technological solutions. Furthermore, socioeconomic benefits and limitations to increase substitution of mineral fertiliser for BBFs will be analysed. A key result of LEX4BIO will be a universal, science-based toolkit for optimising the use of BBFs in agriculture and to assess their environmental impact in terms of non-renewable energy use, greenhouse gas emissions and other LCA impact categories. LEX4BIO provides for the first-time connection between production technologies of BBFs and regional requirements for the safe use of BBFs.

The project runs from June 2019 to May 2024, with an extension of 12 months due to COVID-19. It involves 20 partners and is coordinated by Luke (Luonnonvarakeskus - Natural Resources Institute Finland).

More information about the project can be found at: <http://www.lex4bio.eu>



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D8.4: PROJECT NEWSLETTERS

1. INTRODUCTION

The overarching objective of LEX4BIO is to decrease EU dependency on imported, finite P fertilisers and energy intensive N fertilisers by utilising the full potential of nutrient-rich side streams (NRSS) as bio-based fertilisers (BBF) without compromising the food and feed safety and supply, human health and environmental protection (Figure 1).



Figure 1. Overall goal of LEX4BIO for reaching circular economy through better utilization of nutrient-rich side streams as bio-based fertilizers (BBF) in EU agriculture.

The overcoming of obstacles restricting the use of BBFs and subsequently taking full advantage of their utilization in the European agriculture requires BBFs acceptance at large, including farmers, consumers, fertiliser and food industry representatives, and other stakeholders from various fields involved in a circular economy. With this regard, coherent dissemination and communication activities play a key role for fostering a greater impact towards policy support for BBFs at the EU level during LEX4BIO lifecycle but also for ensuring the sustainability and transferability of its generated knowledge upon project's completion.

This document is dedicated to LEX4BIO newsletter – an essential enabler for the successful accomplishment of the following communication goals defined in the project's Dissemination, Communication and Exploitation (DEC) Plan (D8.1):



- To engage all relevant stakeholders and strategically selected target groups with the activities and results of the project
- To inform and raise awareness about the project itself and project results

The electronic newsletter of the project is considered a powerful, high-conversion and cost-effective online communication tool, targeting predominantly end-users, such as farmers and consumers, but holding also high potential for delivering project's key messages and scientific findings to industry representatives as well as national, regional and European regulatory and legislative bodies, and the scientific community. In addition to increasing the visibility of the project, it contributes to raising the awareness about, and institutions' commitment to, important global issues, such as the circular bioeconomy, nutrient recycling and agronomic efficiency among others. Additionally, it facilitates building a database of contacts interested in the project results that can become part of an overall stakeholder engagement database, suitable for use in future projects.

2. BACKGROUND

2.1. LEX4BIO NEWSLETTER – CONCEPT AND TIMELINE

Being part of the project's communication toolbox, LEX4BIO newsletter is described in two deliverables – Dissemination, Communication and Exploitation Plan (D8.1), and Portfolio of communication materials and the general project website (D8.2). The newsletters, in their entirety, comprise the storyline of LEX4BIO, from its launch and the definition of its ambition and key objectives, to the dissemination of its central outputs, challenges it faced along the way and implemented measures for their overcoming. These concise news bulletins represent means of direct communication with interested in the project's developments stakeholders.

The main areas addressed in the newsletters in accordance with the DEC Plan are listed below:

- Presentation of the project
- Articles on project work activities progress
- Events organized by the project
- Project's presentation at conferences, meetings, symposia and other events, to include partners dissemination activities and participation as presenters in scientific or policy-related events
- Project's publications (scientific papers, reports, deliverables)
- Project related initiatives, liaisons, synergies, cooperation and collaborations.

All partners have been continuously encouraged to participate in the content generation for the newsletter. EUROPROJECT (EP) is responsible for coordinating the work, soliciting contributions from members, organizing the content, editing and distributing the newsletter via a MailChimp account. In order to facilitate partners' contributions, EP has developed an Event reporting template to cover reports about project related events that partners have organized or participated in, to include the NDFs. Some of the items they needed to address were name, goal, date and venue of the event, approximate number and type of audience reach, summarized description and key discussion points, impressions, and visual material. Another template that was created in M46 was the Content Planner aiming to organize the creation and dissemination of LEX4BIO popular science articles, providing for



consistent publication cadence and reach to wider audience of citizen scientists and non-specialists, for example.

The initial newsletter mailing list was created by consortium members sharing their network of close contacts. This list continued to grow via the Contact Form situated on LEX4BIO website's "Home" page and the Subscription Form added to the Newsletter page of the website. In an effort to maximise audience reach, the Consortium partners have been invited to further distribute the newsletter to other professional contacts and colleagues, preparing grounds for potential collaborations regarding knowledge transfer or joint applications in next projects.

Compliance

LEX4BIO newsletter is designed in full compliance with General Data Protection Regulation (GDPR). The email footer displays the sender's address and offers the freedom to recipients to unsubscribe or opt-out from the subscription.

According to the Grant Agreement, the project committed to issuing 8 newsletters throughout its lifetime, as the initial DEC Plan foresaw the release of one issue every six months. Due to COVID-19, this rhythm needed to be adjusted to the new reality as far as the decreased possibilities for holding events were concerned, such as National Dissemination Forums, field trials, field days, scientific conferences and others. Despite the challenges, partners remained in active communication and the delay in the production and distribution of LEX4BIO newsletter was gradually caught up since July 2022.

In terms of target audience, as mentioned earlier, the newsletter was identified to serve mainly professionals in soil science, researchers and end users, such as farmers and consumers. However, given it reinforces LEX4BIO scientific results and deliverables, it is highly likely it reaches policy makers and industry stakeholders as well.

2.2. GENERAL DESCRIPTION AND PERFORMANCE ANALYTICS

The newsletter is developed in English and everybody can subscribe free of charge to it from the project's website where it is available too, in downloadable format, under [Media and Communication/Newsletters](#) (Figure 2).



NEWSLETTERS

The shortest way to learning LEX4BIO results first
Subscribe to project's Newsletter!

Your name

Your organization

Your email address

I have read and agree to the terms & conditions



Figure 2. LEX4BIO Newsletters page on the website, with subscription form and published issues available for download.

The newsletters are also accessible from the website's "Home" page, Media corner, as shown in Figure 3 below.

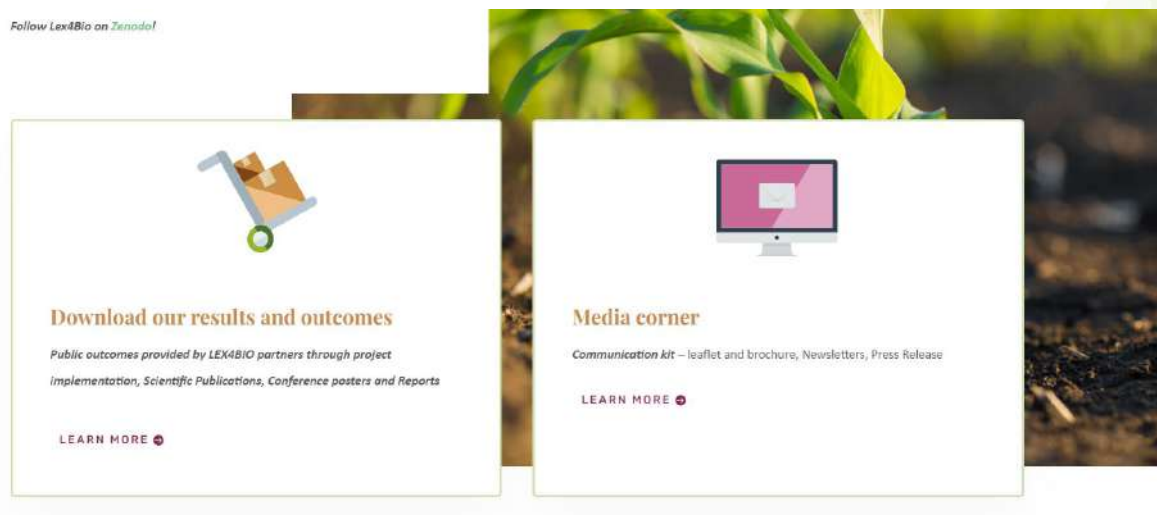


Figure 3. Link to LEX4BIO newsletter from website's Home page.



Each newsletter is branded in the project's colours and font, per the graphic charter, and always starts with the same header on top, which includes the number of the respective issue, date, the logo and name of the project. It is followed by a section displaying the aim of the project and a link to its objectives, leading the reader to the relevant section on LEX4BIO website (Figure 4).



Figure 4. LEX4BIO newsletter header.

Besides providing visual consistency, this approach grants the readers the comfortable feeling of returning to a familiar place, where they know the matter and what to expect, associated with feelings of reliability and predictability.

The opening rubric following the header is the “Word from Kari Ylivainio, LEX4BIO Coordinator” and is also permanent. It constitutes a broad-picture summary by the project coordinator of the overall work progress, milestone events and sometimes, faced challenges. The subsequent content structure of the newsletter adheres more or less to the following scheme:

- articles on project's work activities – results, experiences, consortium meetings, challenges, best practices, findings
- events organized by the project – focused mostly on National Dissemination Forums, field days, field trials, seminars, final conference
- LEX4BIO visibility – project's presentation at, and participation in, events, such as scientific conferences, symposiums, exhibitions, fairs, public hearings, etc.
- LEX4BIO networking – dedicated to synergy events with related projects, platforms and initiatives, joint participation in events with sister projects, joint community and cluster membership, and event participation and organization.



The final section features a colourful, attention grabbing “call to action” prompting readers to go to a particular location on LEX4BIO website and learn more about project’s activities. It is followed in the footer by LEX4BIO social networks icons, linked to the respective accounts in Facebook, Twitter and LinkedIn, the “unsubscribe” option and the EU acknowledgment and disclaimer (Figure 5).



Figure 5. LEX4BIO newsletter footer and EU acknowledgment.

The stories in the newsletter contain links leading to more details about the events they briefly feature on LEX4BIO website. This is important for generating traffic to the website, which increases its authority ranking by the Google crawlers, resulting in higher appearance in the Search Engine Results Pages (SERP) upon a keyword search. Therefore, some of the important parameters to track in a newsletter email campaign performance are the delivery and open rate as well as the link click rate. The average amounts for these indicators from the project’s first newsletter in 2019 until May 31, 2023 (M48) could be seen below:



- Subscribers number grew steadily from 386 in 2019 through 468 (2021) to 457 in May 2023 – although the number has slightly decreased due to some unsubscribed clients, the trend keeps being on the rise;
- Average successful delivery rate – 90 %
- Average open rate – 25.3%

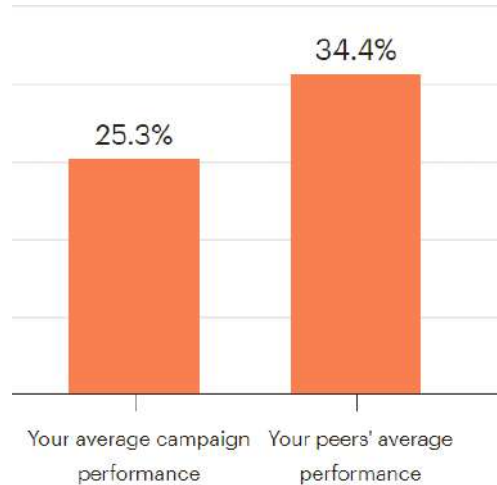


Figure 6. Comparative view of average open rate performance.

- Average click rate - 6.6%

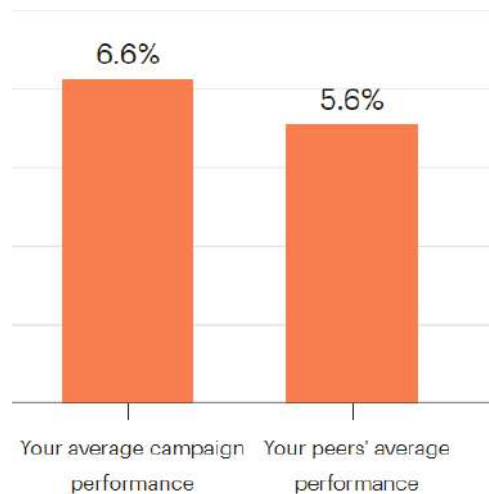


Figure 7. Comparative view of average click rate performance.

According to [Campaign Monitor's 2022 Email Marketing Benchmarks Report](#)¹, the average email open rate was 21.5%, across all industries in 2021 while the industries with the highest open rates, like Education, Agriculture, and Financial Services, average between 25-28%. Agriculture falls within the industries with the highest click-through rates too where they average between 3-5%. Therefore, it would be reasonable to claim that LEX4BIO is performing quite well based on its current analytics.

¹ <https://www.campaignmonitor.com/resources/guides/email-marketing-benchmarks/>



At present, the newsletter audience of LEX4BIO project amounts to 456 subscribers as according to the built-in analytical tool of MailChimp, 4 new subscribers were gained for the last month, from May 1 – 31, 2023, through the popup subscription form.

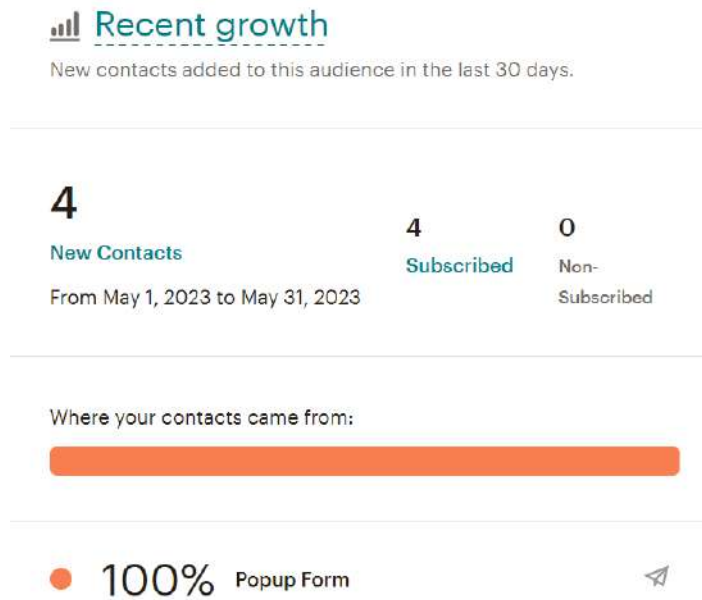


Figure 8. Audience growth, May 1-31, 2023.

It is noteworthy that the majority of LEX4BIO email clients (62.1%) access the newsletter campaigns from their desktops and less than 38% come from mobile devices.

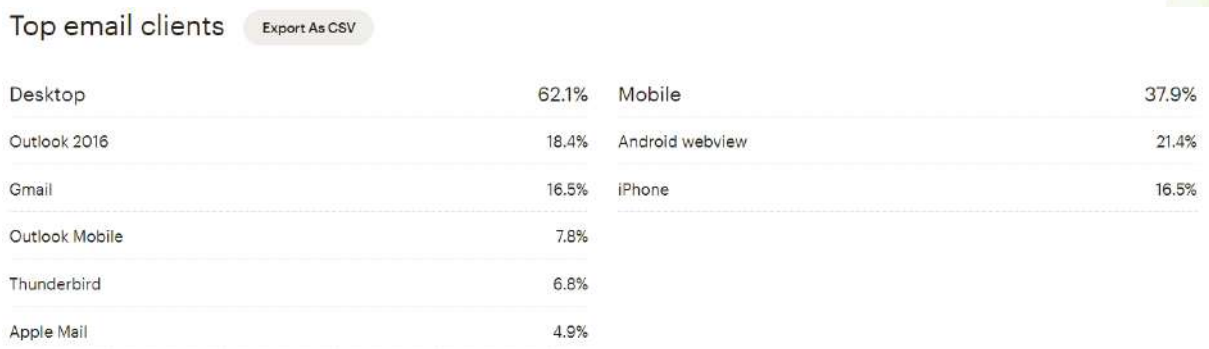


Figure 9. Desktop vs. mobile traffic.

As seen in Figure 10 below, the top geographical locations project subscribers come from are Finland and Germany. More than 25% of the audience comes from other parts of the world.



Top locations




Other	26.6%
 Finland	9.8%
 Germany	9.1%
 Netherlands	4.2%
 Spain	3.8%

Figure 10. Top geographical locations of subscribers.

3. CHRONOLOGICAL OVERVIEW

This section allows for grasping the historical storyline of LEX4BIO developments as it provides an overview of each newsletter, from the oldest to the latest, with a brief outline of content and time period it covers. The collection of all newsletters published by LEX4BIO until after its second Review Meeting could be found in ANNEX 1 at the end of this document. It's noteworthy that Newsletter #6 was added after the end of RP2 (M48), following EC recommendations.

3.1. Newsletter #1, December 2019

The first newsletter of LEX4BIO is dedicated to the first six months from the project's launch. It covered the kick-off meeting in Finland in June 2019 and introduced the importance of WP2 first activities related to the evaluation of the current and novel BBFs with the aim of selecting 15-20 promising BBFs for further testing. It also staged the concept of the NDFs as signature events and linked to a website article about the first set of these in Germany and Austria. At the end are found the first cross-cooperation and joint promotional activities established with Biorefine Cluster Europe, European Sustainable Phosphorus Platform and more. Take a look at [Newsletter #1](#).

3.2. Newsletter #2, December 2020

Despite the hit of COVID-19 pandemic, LEX4BIO consortium continued their work and managed to issue the second newsletter in the end of December 2020, covering a period of one year (M7 – M18) of the project's existence. The novelties were the introduction of WP3 activities studying the phosphorus fertilisation value of broad range of selected bio-based fertilisers (BBF) for testing in five field experiments from Finland to Spain, and another NDF held in Spain. Take a look at [Newsletter #2](#).

3.3. Newsletter #3, December 2021

LEX4BIO reached its mid-point after receiving a one-year extension, due to the delays caused by COVID-19. All work packages were actively engaged with research activities, with results looming to be presented at conferences and workshops. What else this issue talks about is listed below:



- NDF conducted in Denmark
- A cross-seminar of LEX4BIO with FERTIMANURE project organized during the Green Deal Conference
- A scientific paper by BOKU published in Science of The Total Environment

Take a look at [Newsletter #3](#).

3.4. Newsletter #4, July 2022

The newsletter that is marking the gradual return to normal and regaining of the planned cadence of publication and distribution. The second year of field trials across the EU have started in the spring of 2022 leading to resumption of the NDFs, starting from Austria. LEX4BIO dissemination activities reenergized and appeared as stories featuring an open day at the University of Hohenheim, participation in a Biorefine Cluster Europe (BCE) conference in Belgium, and WETSUS Phosphorus Symposium in the Netherlands. This newsletter promotes another one of LEX4BIO's scientific publications, project's poster presentation to the scientific community in Copenhagen as well as an updated section on networking with related projects, and events where LEX4BIO could be met in the fall of 2022. Take a look at [Newsletter #4](#).

3.5. Newsletter #5, January 2023

Year 2022 was an unprecedented time for Europe and especially devastating for Ukraine with the war affecting our lives. One of the negative economic ramifications was the increased price of fertilizers, which in turn continued to maintain the interest in LEX4BIO results high. The 6-month period covered by the newsletter is intense from the point of view of dissemination through a considerable number of scientific peer-reviewed publications, LEX4BIO participation in conferences and kindred events, a public hearing with DG AGRI at the European Parliament, a position paper on circular bioeconomy, reports and of course, many more NDFs conducted by partners. The highlight of the networking activities is featured in the stories about the second cross-seminar of LEX4BIO and FERTIMANURE in December 2022 and LEX4BIO joining the Nutrient Recycling Community as leader of the Agronomic Performance sub-group. Take a look at [Newsletter #5](#).

3.6. Newsletter #6, June 2023

The first half of 2023 proved to be quite productive in terms of communication and dissemination activities. It is the time when all harvested data undergoes evaluation in order to find the tools to better utilize BBFs from environmental and economical point of view. This also supports the industry to invest in the most promising BBFs, targeted to various climatic and soil conditions across the EU. Field days were conducted in Germany and Switzerland, a large-scale Survey aiming to ascertain end-users barriers towards replacing mineral fertilizer with biobased alternatives was conducted and the project produced an e-booklet featuring its key outputs. On the policy making front, the project joined the nutrient recycling community of researchers in the development of a consensus position paper on the definitions of "biobased fertilizer" or "biobased nutrient. Take a look at [Newsletter #6](#).



4. CONCLUSION

Post second reporting period review meeting, this deliverable was re-opened in accordance with the EC recommendations and this updated version contains all project's newsletters published until M52, namely six issues. Due to LEX4BIO extension with 12 months, two more newsletters are expected to be prepared by the end of the project in order to be in compliance with the DEC Plan (D8.1). One consequence of COVID-19 pandemic was a slowing down in the newsletter's publishing rhythm of every six months. With the resumed tempo of operations and wealth of generated research outcomes and activities to be shared with LEX4BIO followers and supporters, the project had steadily caught up with the newsletter releases. Newsletter 7 is expected around the end of 2023, while our final issue, Newsletter 8, will appear in the final month of the project, May 2024, to report on final results, final conference, lessons learned, and likely, future opportunities to build upon LEX4BIO knowledge.

Following the recommendations of the European Commission, the last two newsletters will be included in D8.6 "Report on communication and dissemination activities and outcomes" due in M60.

This compilation of all project newsletters reveals the evolvement of LEX4BIO communication and dissemination activities – from introducing the project's ambition and objectives in the beginning to intensified focus on presenting the important outputs delivered by the researchers involved in the project and strengthened meaningful cooperation with similar projects and initiatives.

It is important to highlight that this deliverable is complemented by:

- D8.1 "Dissemination, communication and exploitation plan" and
- D8.2 "Portfolio of communication materials and the general project website"

ANNEX 1. PROJECT NEWSLETTERS COMPILED

[View this email in your browser](#)



Newsletter #1 - December 2019

Optimizing Bio-based Fertilisers in Agriculture
Knowledgebase for New Policies

Get to know us!

LEX4BIO aims to identify and quantify nutrient-rich side-streams and evaluates technologies for producing safe, efficient and regionally targeted bio-based fertilizers in the EU. LEX4BIO will provide policy recommendations for achieving a higher use efficiency of bio-based fertilizers and socioeconomic improvements for the rural population.

[Click here to discover our project objectives](#)



Word from Kari Ylivainio, LEX4BIO coordinator

LEX4BIO has been running for six months now and project activities have started to gear up. So far, we've focused on planning the activities for the coming years, especially selecting the bio-based fertilisers (BBFs) for the upcoming trials. Dissemination and communication activities of LEX4BIO have mainly focused on organizing national discussions across Europe in order to involve relevant stakeholders in the project's activities. Stakeholders from different fields, e.g. regulatory authorities, agricultural advisory services, farmers' unions and NGOs, have been included in the national discussions. These future-oriented discussions will provide the basis for developing a policy roadmap towards better utilization of BBFs across the EU and thus reducing the EU dependency on mineral fertilisers, providing tools for closing nutrient cycles and mitigating climate change. If you are interested engaging for the activities of LEX4BIO do not hesitate to contact us.



A first meeting to network and gather the 21 partners of the LEX4BIO project

The Kick-off Meeting of Lex4bio has been organised on the 12th and 13th of June 2019 in Finland. It was a great occasion for all participants to discover the promising Lex4bio team composed of major actors in the field of BBFs.

[Learn more](#)



First results of the LEX4BIO project: discover our WP2 activities

WP2 focuses on the general effects of BBFs on soil quality and plant growth. Currently, the WP2 participants are developing task 2.1 as its outcome is crucial for the entire course of the LEX4BIO project. T2.1 is aiming at evaluating the current and novel BBFs with the aim of selecting 15-20 promising BBFs for further testing.

[Learn more](#) and answer our [questionnaire](#)

Organisation of our first set of National Dissemination Fora (NDF)

During the 4 years of the LEX4BIO project, partners with research institute / university background are committed to the organisation of annual NDFs. Participants in NDF represents ministries of agriculture and environment, advisory services, farmers union and representatives from industry and NGOs (e.g. fertiliser industries, research institutes, nutrient platforms, universities, associations of organic farmers), securing large scale dissemination to all relevant stakeholders and establishing strong communication channels for dialogue and mutual inspiration.

[Learn more about NDF in Germany and in Austria](#)



Networking as a key to maximise LEX4BIO impacts

Since the beginning of the LEX4BIO project, networking activities have been undertaken to ensure cross-cooperation with relevant projects and clusters at EU scale. Several joint-activities and joint-promotion have already started. [Learn more](#)



LEX4BIO visibility during the past 6 months – Discover our dissemination activities

LEX4BIO in the scientific community: Since its launch in June 2019, LEX4BIO has been presented during several international events, ensuring to gain in visibility and attract stakeholders in supporting the achievement of our objectives. [Learn more](#)

LEX4BIO is online: From the beginning of the project, LEX4BIO is benefiting from a large on-line visibility. The website dedicated to the project has been launched in November 2019 and is providing a set of information, contents and results that are publicly accessible. Hence, over the 4 years of the project duration, you will be able to download directly from our web platform, all the [deliverables and outcomes](#) that will be issued through the implementation of LEX4BIO.



[Find out where to meet us in 2020!](#)

All the LEX4BIO partners wish you very nice holidays and all the best for 2020. Thank you for supporting the implementation of the ambitious LEX4BIO project.

Want to change how you receive these emails?
You can update your preferences or unsubscribe from this list.

You are receiving this e-mail as you are part of the LEX4BIO community!

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 818309 (LEX4BIO). This output reflects only the author's view and the European Union cannot be held responsible for any use that may be made of the information contained therein.





Newsletter #6 - June 2023

Optimising bio-based fertilisers in agriculture –
Providing a knowledge basis for new policies

Get to know us!

LEX4BIO aims to identify and quantify nutrient-rich side-streams and evaluates technologies for producing safe, efficient and regionally targeted bio-based fertilisers in the EU. LEX4BIO will provide policy recommendations for achieving a higher use efficiency of bio-based fertilisers and socioeconomic improvements for the rural population.

[Click here to discover our project objectives](#)



Word from Kari Ylivainio, LEX4BIO coordinator

Last year of the project has started and results from laboratory, greenhouse and field scale are currently being evaluated. Furthermore, information about potential drivers and barriers for replacing conventional mineral fertilizers with bio-based fertilizers has been acquired with questionnaires during the recent months. Evaluating all these data will provide us the tools to better utilize BBFs from environmental and economical point of view. This will also support the industry to invest in the most promising BBFs, targeted to various climatic and soil conditions across the EU.

Interesting results of LEX4BIO will be presented for the various stakeholders during the last year of the project. By following us on social media, including LEX4BIO's webpage (www.lex4bio.eu), you will stay up to date with our on-going and future activities.

LEX4BIO FIELD DAYS

With weather warming up and days growing longer, LEX4BIO partners started organizing planned field days. The idea behind these events is to demonstrate to interested stakeholders the potential of bio-based fertilizers for agriculture. Two field days were conducted in May.

Julius Kühn Institut Field Day, Germany



On May 12, LEX4BIO partner Julius Kühn Institut hosted a field day in Germany dedicated to studying the potential of biobased fertilizers in agriculture. A fertilizer trial where different organic fertilizers were tested for their agronomic performance was presented. Local organic fertilizers, such as composts (biowaste, green waste, sewage sludge), digestates (mixed and from pig manure), sewage sludge and poultry dung were tested in comparison to straw as a control and mineral fertilizer control.

In another trial, different fertilizers from wastewater treatment plants (three different struvites – $\text{MgNH}_4\text{PO}_4 \times 6\text{H}_2\text{O}$) were tested in comparison to mineral phosphorus (P) fertilization and plots without P application, or without P and magnesium (Mg) application to differentiate between P or Mg effects on crops.

Follow the link to discover more about the first results <https://lex4bio.eu/2023/06/06/potential-of-biobased-fertilizers-bbfs-in-agriculture/>

Field Visit hosted by Research Institute of Organic Agriculture (FiBL), Wallbach, Switzerland

The Research Institute of Organic Agriculture (FiBL) organized a field visit to their long-term recycled fertilizer field trial in Wallbach, Switzerland. It is part of WP4 validation trials in LEX4BIO project and took place on May 23, 2023. The event was attended by 15 participants, representatives of federal offices (Swiss Federal Office of Energy, Swiss Federal Office for the Environment), private companies involved in fertilizer production, transportation and application, farmers (Association of Swiss Organic Farmers), (applied) universities and agricultural research institutes.



After an initial inspection of the trial, to compare the performance of the different recycled fertilizer treatments, the applied recycled fertilisers and their composition were presented in greater detail and their application methods were demonstrated.

Read more about the event [here](#)

Work Progress



Get Involved!



[Do LEX4BIO Survey](#)

As part of WP7 activities, Lex4BIO conducted a public survey in order to study the crucial **drivers** and **barriers** regarding the replacement of conventional fertilizers by biobased fertilizers (BBFs). The questionnaire was dedicated to four groups of main stakeholders in the value chain – farmers, consumers, fertilizer producers and companies from the food and beverage sector. It was accessible from the project's website as the survey for farmers was available in 7 languages, while the one for consumers, fertilizer producers (or future producers) and companies from the food and beverage industry - in 3 languages.

Check out LEX4BIO website to discover the findings of the survey through the Report on drivers and barriers regarding the replacement of conventional fertilisers by BBFs for all stakeholders – an official **deliverable**, which will be published soon.

7th Consortium Meeting

Lex4bio Project 7th consortium meeting took place online, 14 months before the project ends in May 2024. Partners are happy with the achieved results in studying the **agronomic N and P efficiency** of BBFs and the potential of the latter for replacing mineral P **fertilizers** in Europe.

A lot has been achieved with regard to risk assessment and ecotoxicological study, lifecycle assessment and social acceptance of biobased fertilizers. At this stage of work, the discussion was naturally focused mostly on data analysis and planning of upcoming dissemination and communication activities. Many scientific publications are currently in the making, along with exploring opportunities for joint paper production with some of Lex4Bio related projects.

It will be a busy period for Lex4Bio partners in their preparation for the second reporting period, followed by our next physical meeting in Seville this fall.

Follow our LinkedIn page to stay informed about the events we are planning and the deliverables we are going to publish soon.



The poster features the Lex4Bio logo at the top left, which consists of a circular emblem with a sunburst at the top, two leaves at the bottom, and the text 'LEX4BIO' in the center. To the right of the logo is a photograph of hands holding a small green seedling. Below the logo, the text '7TH PROJECT MEETING' is displayed in large, bold, green letters. Underneath this, the phrase 'We talk:' is followed by a bulleted list of topics: data analysis, dissemination activities planning, collaboration opportunities, scientific publications, and results. To the right of the text is a screenshot of a video conference grid showing several participants. At the bottom left, the website 'www.Lex4Bio.eu' is listed next to a smaller version of the Lex4Bio logo. At the bottom right, there is a photograph of a field of green crops with a play button icon overlaid on it.

LEX4BIO

7TH PROJECT MEETING

We talk:

- data analysis
- dissemination activities planning
- collaboration opportunities
- scientific publications
- results

www.Lex4Bio.eu

LEX4BIO e-booklet

We are happy to share that we produced an electronic booklet with two signature for LEX4BIO scientific publications, constituting key project outputs. They evaluate the potential for replacing mineral fertilizers with bio-based fertilizers, relying on renewable phosphorus and nitrogen sources, such as nutrient-rich side-streams.

[Click here to download the e-booklet](#)

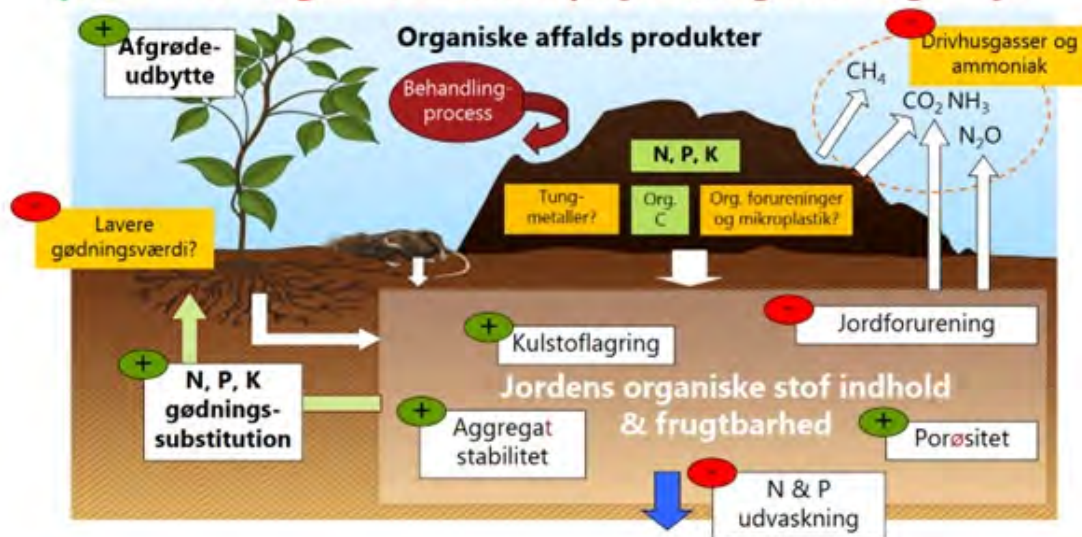
E-Booklet



Conference Presentations

UCPH presenting LEX4BIO outputs at the Danish Plant Congress
2023

Bio-baserede gødninger kan potentielt have både positive & negative effekter på jord, afgrøder og miljø



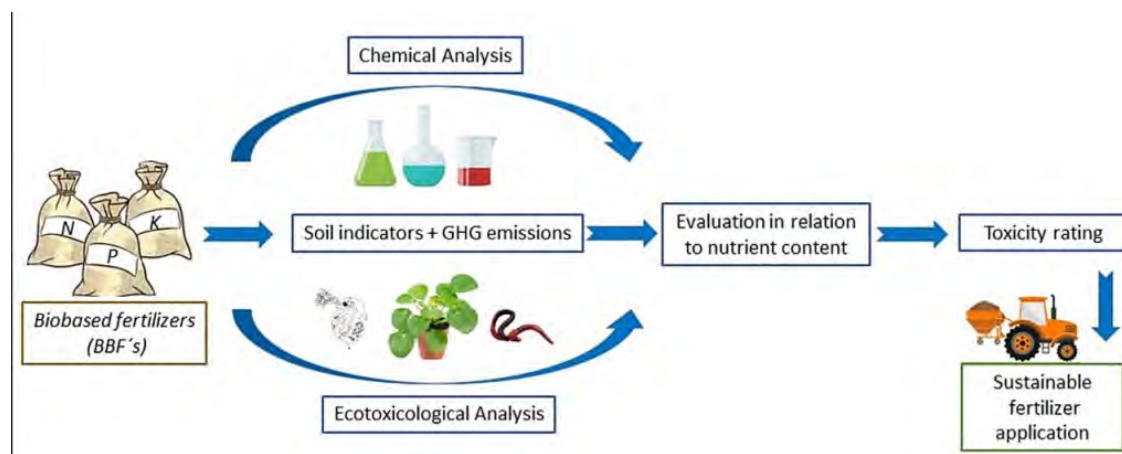
The leader of LEX4BIO research activities on the agronomic efficiency of bio-based fertilisers as N source for crops, Lars Jensen, UCPH, was invited to the Danish Plant Congress 2023 ("Plantekongressen 2023"), held 11 – 12 January in Herning, Denmark to talk about bio-based fertilisers, new EU Fertilizing Products Regulation (FPR), and results on potential ammonia loss and fertiliser value from such bio-based fertilisers. The large 2-day annual event welcomed more than 2000 participants from the areas of Denmark, Sweden and Norway, to include farmers, advisors, researchers, public authorities and students.

[Read more](#)

Scientific publications by Lex4Bio

Ecotoxicological methods to evaluate the toxicity of bio-based fertilizer application to agricultural soils – A review

Authors: Sophia Albert, Elke Bloem, Julius Kühn-Institut (JKI), Federal Research Centre for Cultivated Plants, Institute for Crop and Soil Sciences, Germany



Review Highlights:

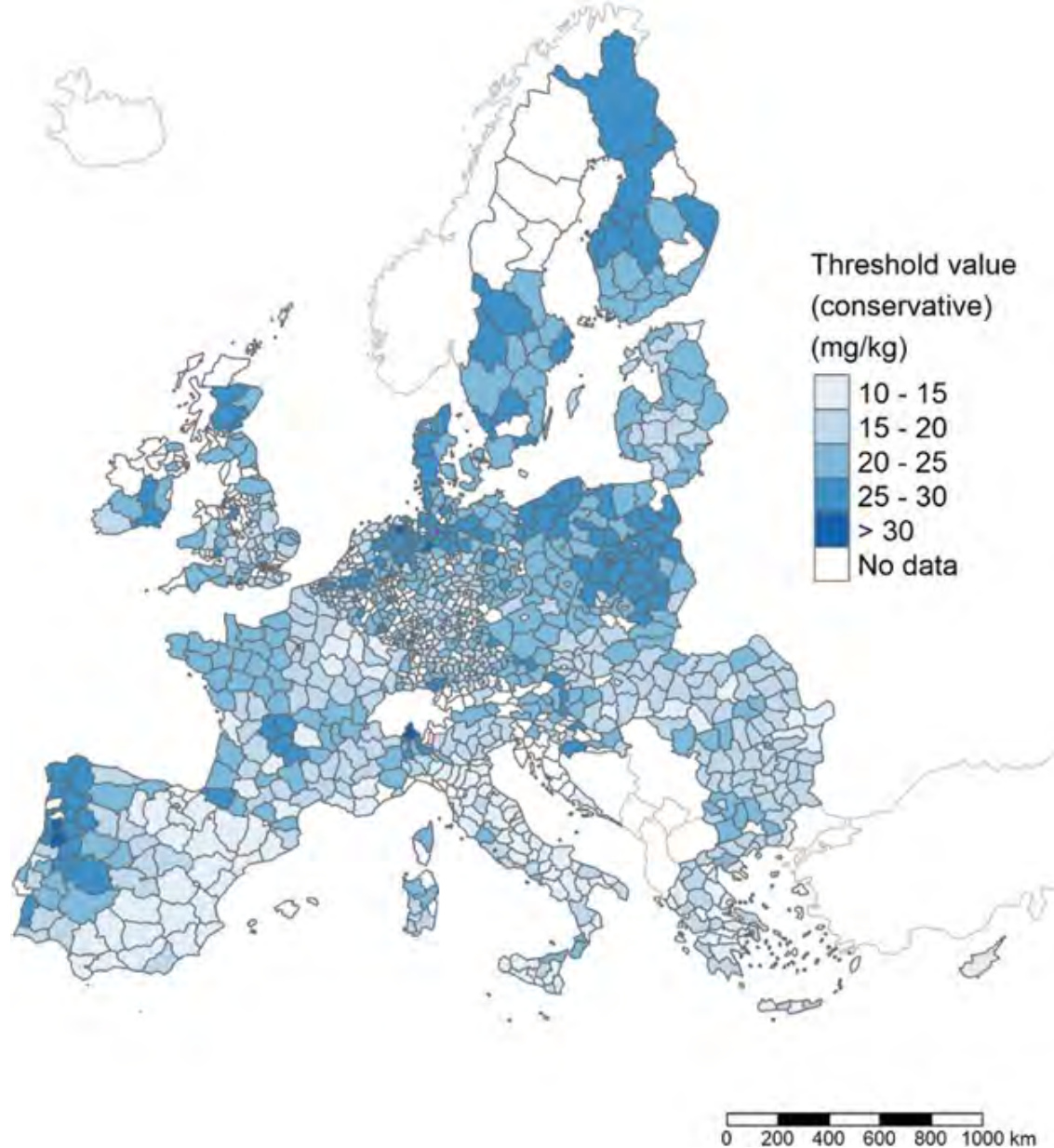
- Bio-based fertilizers (BBFs) can contain a multitude of contaminants.
- Test batteries of ecotoxicological tests are suitable for the evaluation of BBFs.
- A combined approach of chemical & ecotoxicological evaluation and soil indicators is recommended.
- Ecotoxicity rating helps to advance a sustainable BBF production and to implement circular economy.

Read the full paper [here](#).

Assessing the phosphorus demand in European agricultural soils based on the Olsen method

This paper, available in [LEX4BIO e-booklet](#) as well, came out as a result of the work of a joint team of LEX4BIO soil scientists and discusses that a more precise allocation of Phosphorus is possible by identifying sites where agricultural production can be increased with phosphorus fertilizers, and also that most of the European demand for the mineral could be covered by recycling P from manure, wastewater, and municipal solid waste.

Europe is highly dependent on imported P. Circular economy strategies and better allocation of the resource is thus critical for ensuring agriculture sustainability.



The University of Seville also featured the work of Professor Antonio Delgado and team on their website.

"We have also verified that most of the European demand for phosphorus could be covered by #recycling this element from manure, wastewater and urban solid waste"
 Professor Antonio Delgado

[Read the paper](#), recently published in the prestigious Journal of Cleaner Production.

Lex4Bio in the spotlight

TV interview

Soil Scientist Elke Bloem, Julius Kühn Institut, Germany about bio-based fertilizers and how to fertilize a private garden best

TV INTERVIEW

GERMAN
ZDF
WISO



BIO-BASED FERTILIZERS AND HOW TO FERTILIZE A PRIVATE GARDEN BEST

The analysis of bio-based fertilizers of different origin, and the processing for different contaminations performed within LEX4BIO caught the attention of a TV team from the program WISO of the German ZDF. They were interested to learn which bio-based fertilizers were advisable to be used in private gardening and what were the advantages in relation to mineral fertilizers.

The interview focused on what contaminations can be expected in the different fertilizers that are available on the market for consumers. From the very start a point was made that “bio-based” is not an equivalent to free of contamination but is referring to organic secondary raw materials that can be used to produce fertilizers, such as plant or food residues, products derived from animals, sewage sludge, bio-wastes or organic wastes of industrial origin. Depending on the origin of the material, different contaminants can be expected in bio-based fertilizers, and so as in mineral fertilizers. Quite often, the description of input materials on products is rather vague and it is not clear if animal-derived products are derived from conventionally grown animals or from organic farming.

Read the [full story](#) and watch the [interview](#).

LEX4BIO featured on **LUKE's website article entitled** „Luke in the forefront accelerating efficient and safe use of recycled fertilisers in Europe“.



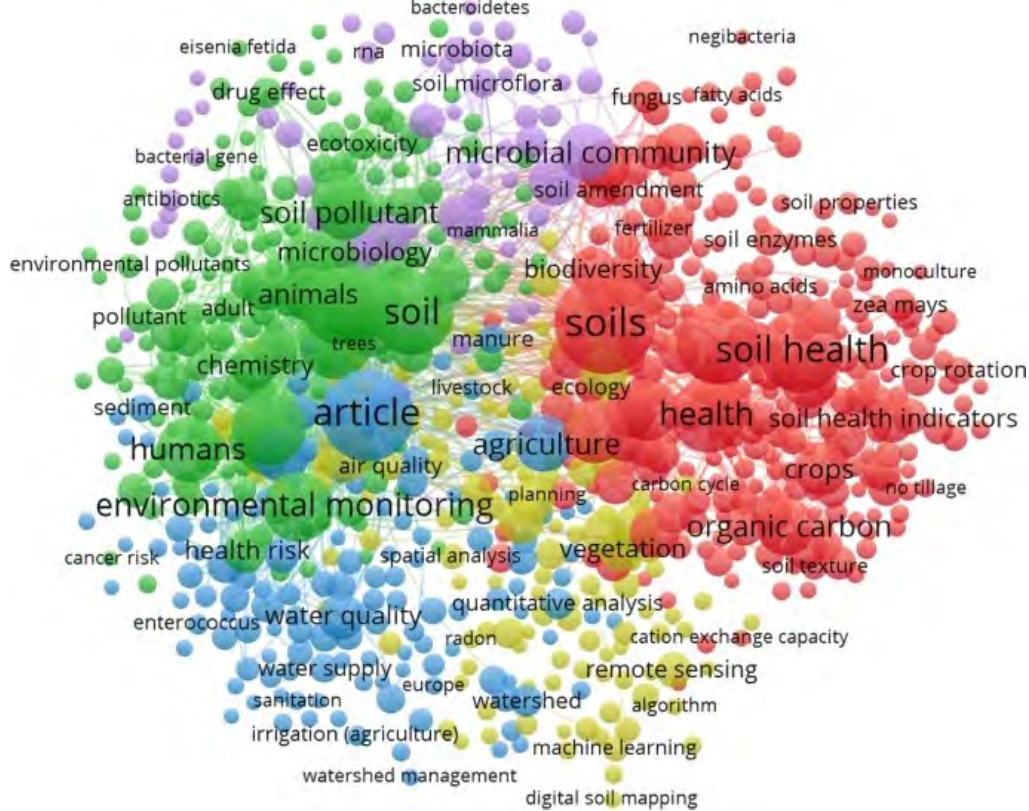
"Manure, sludge and many other side streams do contain nutrients, but can they replace imported fossil fertilisers in Europe? This is what European researchers are finding out in a research project of 20 partners, led by the Natural Resources Institute Finland (Luke) from its research centre surrounded by experimental fields"

Find out more insights about accelerating efficient and safe use of recycled fertilisers in Europe in the [article](#) of the Natural Resources Institute Finland (Luke) / Luonnonvarakeskus (Luke)

What's more...

Opportunities and challenges of bio-based fertilizers utilization for improving soil health

As part of her PhD studies at the Fesetics Doctoral School, University of Agriculture and Life Sciences, Hungary, Ari Kurniawati, *et al.* explores the potential of bio-based fertilizers (BBFs) to facilitate the management of bio-waste and improve soil health conditions. The work takes a look at the opportunities for bio-based fertilizer utilization to sustain plant productivity but also investigates the present challenges before BBFs for being widely accepted as alternative sources to support the circular economy paradigm.



Soil health indicator network visualization. Legend: Color, represents big cluster of disciplines in the research field; nodes, represents keywords (the size of node represents the keywords frequency); links, represent relations between keywords (keywords mentioned together in published articles); colors, represent the temporal orders of appearance of keywords; link thickness, represents the words strength. Source: Researcher, derived from VOSviewer

The review acknowledging LEX4BIO is published in the prominent Organic Agriculture Journal of the International Society of Organic Agriculture Research.

Download the research paper: <https://doi.org/10.1007/s13165-023-00432-7>

In the Policy Making

On the invitation of the European Sustainable Phosphorus Platform, LEX4BIO joined nutrient recycling researches in coining a definition for biobased fertilizers.

Gaining a common understanding of the meaning of “Bio-Based” in the context of fertilizers and plant nutrients seems to be important for a future European Standard on defining and measuring “Bio-Based nutrient” content to support environmental claims and #EU Fertilising Products #Regulation certification.

Following the European Commission's communication on the use of the term “Bio-Based Plastic”, the ESPP European Sustainable Phosphorus Platform notes that the term Bio-Based Fertiliser is already in use in a number of R&D activities and sees a need for a similar discussion regarding “nutrients of solely biological origin” in the EU #Fertilising Products Regulation.

Check out the developed consensus Position Paper on the definitions of “biobased fertiliser” or “bio-based nutrient”:

<https://www.phosphorusplatform.eu/images/download/Proposed%20ESPP%20position%20Bio->

Networking as key to maximising Lex4Bio impact

Since the beginning of LEX4BIO project, networking activities have been undertaken to ensure cross-cooperation with relevant projects and clusters at EU scale. We are glad to have had the chance to participate in December 2022 in a second cross-seminar with FERTIMANURE, discussing the bio-based fertilizers of the future. Another initiative LEX4BIO joined as a sub-group leader was the Nutrient Recycling Community established by Biorefine Cluster Europe and Fertiamnure project.

NEXTGEN BIO-BASED FERTILIZERS – from components to products

Webinar

LEX4BIO's Coordinator Kari Ylivainio was invited as guest speaker to a webinar organized by SUSFERT - SUSTainable FERTilisers project on next generation bio-based fertilizers, which took place on May 23, 2023.

SUSFERT WEBINAR
Meet the speakers

NEXTGEN BIO-BASED FERTILISERS
"from components to products"

Kari YLIVAINIO, Ph.D.
Scientific Coordinator
Lex4Bio

Components for bio-based fertilisers in the EU

Tuesday, 23 May, 2023
10:10am - 11:50am CEST

JOIN THE CONVERSATION
click the link in message

Kari joined the discussion to share insights derived from LEX4BIO about some of the most promising components and raw materials that are currently used in existing fertilisers and which appear to be having highest potential to contribute to sustainable bio-based fertilisers and a circular nutrient economy.

He noted the importance of farmers testing their fields for phosphorus so that the mineral is not needlessly applied.

"We estimated that 72 percent of European farmland does not need phosphorus fertilisation at all. In addition, most of the need for phosphorus fertilisation can be replaced

with recycled fertilisers. However, we will further refine this estimate as the project progresses."

The webinar enjoyed a great interest and was attended by more than 60 people.

Where to find us?

Wageningen Soil Conference 2023

LEX4BIO partner Dr. Boris Jansen, University of Amsterdam will be giving a presentation about LEX4BIO at the fifth edition of the Wageningen Soil Conference in The Netherlands, taking place from August 28 – September 1, 2023.



The conference is interactive in nature, comprising conference sessions as well as workshops on various soil-related topics. This year motto is **working together on solutions for a sustainable world**.

The topics that will be covered during the four conference days are listed below:

- Soils for Society
- Advances in Measuring and Modelling Soil Processes
- Mapping and Evaluating Soil Functions across Scales
- Soils for Nature-Based Solutions

More information about the Conference events [here](#).

Registration closes July 3 - https://event.wur.nl/wsc_2023/subscribe

LEX4BIO is online: From its outset, LEX4BIO project has been benefiting from a large on-line visibility. The website dedicated to the project was launched in November 2019 to provide publicly accessible information on project's goals and objectives, work activities progress and results. Over the entire duration of LEX4BIO, you will be able to download directly from our web platform, **all public deliverables and outcomes LEX4BIO accomplished.**



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You are receiving this e-mail as you are part of the LEX4BIO community!

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 818309 (LEX4BIO). This output reflects only the author's view and the European Union cannot be held responsible for any use that may be made of the information contained therein.





Newsletter #2 - December 2020

Optimizing Bio-based Fertilisers in Agriculture
Knowledgebase for New Policies

Get to know us!

LEX4BIO aims to identify and quantify nutrient-rich side-streams and evaluates technologies for producing safe, efficient and regionally targeted bio-based fertilizers in the EU. LEX4BIO will provide policy recommendations for achieving a higher use efficiency of bio-based fertilizers and socioeconomic improvements for the rural population.

[Click here to discover our project objectives](#)



Word from Kari Ylivainio, LEX4BIO coordinator

Despite COVID 19 crisis LEX4BIO has achieved few significant results in 2020. However, COVID-19 related measures imposed by European governments prevented the smooth implementation of some of the key LEX4BIO activities such as field trials.

Mapping of NRSS and sourcing and evaluating available bio-based fertilisers (BBF) in the EU were the starting point for LEX4BIO activities. However, COVID-19 slowed down these activities from February 2020 onwards and lock-down in many EU member states practically stopped the activities in many partner's organizations in spring 2020 and forced consortium to postpone the start of the planned field trials (WP3 and WP4) to spring 2021. Due to the delays caused by COVID-19, consortium prepared an amendment requesting to postpone LEX4BIO for 12 months.

National discussions organized mainly in the first project year provided the basis for developing a policy roadmap towards better utilization of BBFs across the EU and thus reducing the EU dependency on mineral fertilisers, providing tools for closing nutrient cycles and mitigating climate change. If you are interested engaging for the activities of LEX4BIO do not hesitate to contact us.

Below we have presented few achievements of LEX4BIO in the past 2020 year.



First results of the LEX4BIO project: discover our WP3 activities in 2020

In WP3, phosphorus fertilisation value of broad range of bio-based fertilisers (BBF), covering organic, organo-mineral and mineral BBFs from 7 material categories, have been selected and distributed for testing in five field experiments from Finland to Spain. Together with these potential CE-marked BBFs tested in field scale, at least 25 other P-BBFs will be tested in pot experiments with different crops and soil types.

Two pot experiments conducted in 2020 indicated that several P-BBFs are comparable to common mineral P fertiliser, triple superphosphate. A screening of national fertiliser regulations with respect to total and soluble P requirements in fertilisers clearly showed the need to develop a unified approach for testing BBFs. A subset of soil samples from the LUCAS soil archive has been selected for optimum coverage of soil characteristics across the EU. Finally, preparations for an experiment to assess potential leaching of P after mixing BBFs with different soil types in Europe is under preparation for starting the experiment in 2021.

National Dissemination Forum (NDF) in Spain

A meeting was held on 5 October 2020. Three relevant companies producing compost were invited and attended the meeting. Until now, composting has been the main transforming process for valorizing these relevant residues. Regarding the use, companies producing compost, in some cases branch of very big services companies such as VALORIZA, offer the product as "soil amendment" more than "fertilizer" taking into account all the potential effects contribution to soil functioning (organic matter supply).



Networking as a key to maximise LEX4BIO impacts

Since the beginning of the LEX4BIO project, networking activities have been undertaken to ensure cross-cooperation with relevant projects and clusters at EU scale. Several joint-activities and joint-promotion have already started. [Learn more](#)



LEX4BIO VISIBILITY in 2020 – Discover our dissemination activities

LEX4BIO in the scientific community: In 2020, LEX4BIO has been presented during several international events, ensuring to gain in visibility and attract stakeholders in supporting the achievement of our objectives. [Learn more.](#)

LEX4BIO is online: From the beginning of the project, LEX4BIO is benefiting from a large on-line visibility. The website dedicated to the project has been launched in November 2019 and is providing a set of information, contents and results that are publicly accessible. Hence, over the 4 years of the project duration, you will be able to download directly from our web platform, all the deliverables and outcomes that will be issued through the implementation of LEX4BIO.



Find out where to meet us in 2021!

All the LEX4BIO partners wish you all the best for 2021.

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Newsletter #3 - December 2021

Optimising bio-based fertilisers in agriculture –
Providing a knowledge basis for new policies

Get to know us!

LEX4BIO aims to identify and quantify nutrient-rich side-streams and evaluates technologies for producing safe, efficient and regionally targeted bio-based fertilisers in the EU. LEX4BIO will provide policy recommendations for achieving a higher use efficiency of bio-based fertilisers and socioeconomic improvements for the rural population.

[Click here to discover our project objectives](#)



Word from Kari Ylivainio, LEX4BIO coordinator

LEX4BIO has now reached its mid-point after receiving a one year extension, due to the delays caused by COVID-19. All work packages are currently actively engaged on research activities and interesting results have started to accumulate on the properties of bio-based fertilisers, including their agronomic efficiency, potential hazardous substances, and nutrient losses, either through volatilisation or leaching. These results will be presented in the near future at conferences and workshops. Furthermore, the first field day for presenting the agronomic efficiency of bio-based fertilisers took place in summer 2021 and more field days will be arranged in 2022.

Recent development of mineral fertiliser prices on the world market indicates that bio-based fertilisers are gaining more interest among farmers and LEX4BIO is aiming to increase the share of bio-based fertilisers in agriculture. At the same time, the project aims to secure the productivity of agriculture, as well as food safety. These goals will also provide tools for reaching climate neutrality set by the EU. If you are interested learning more about LEX4BIO, follow us on social media, including our webpage: www.lex4bio.eu.



2nd LEX4BIO National Dissemination Forum event in Denmark

The LEX4BIO National Dissemination Forum (NDF) in Denmark has been set up and coordinated by the Danish partner University of Copenhagen (UCPH), in collaboration with the agricultural organisation SEGES (the Danish National Agricultural Advisory and R&D center). A cross-sectoral *Fertilisers Network* is organized by SEGES for professionals with particular interest and responsibilities in fertilisers, fertilisation strategies and related technologies (agro-industry, fertiliser companies, local and national agricultural advisors, researchers, technology innovation centers, NGOs and administrators from public agencies). This network meets annually for a workshop and will serve as an ideal forum for the LEX4BIO NDF, ensuring effective transfer of knowledge about the project's key outcomes and findings of relevance in both Denmark and EU. To strengthen this dissemination further, the network will also serve as the NDF for the related EU-H2020 project Nutri2Cycle.

The first LEX4BIO NDF Denmark event took place in June 2019, shortly after the LEX4BIO project started, so only general info about the objectives and planned activities was communicated. In 2020 the NDF meeting was held on 5 October 2020 in Spain - three relevant companies producing compost were invited and attended the meeting. In 2021 the meeting was held on 1st July in Denmark again in collaboration with UCPH at our experimental farm, where we could communicate LEX4BIO outcomes and results of the project so far.



PhD student Lærke W. Larsen presenting the LEX4BIO field trial with 10 biobased fertilisers

In total 31 person participated in the event, with a program including both a field excursion, talks and discussion. The field excursion in the morning visited several sites: the LEX4BIO field trials with N-effect of a number of bio-based fertilisers, which are taking place simultaneously in 5 places in Europe and demonstration of measurements of nitrous oxide and carbon sequestration in field trials with catch crops and biobased fertilisers.

The meeting program in the afternoon contained talks by Lars Stoumann Jensen and subsequent discussion about i) the new Fertilising Products Regulation, which enters into force from 2022 - What is it and which impacts will it have on the fertiliser market and farmers uptake? and ii) introduction to the activities in EU-H2020 project LEX4BIO, as well as the Nutri2Cycle and FertiCycle projects.

The participants were generally very interested in the topics addressed at the meeting, and asked lots of questions both during the field trial excursion and the subsequent session with talks and discussion. During the morning field trip, many were quite surprised to see how effective several of the commercially available biobased fertilisers were in the LEX4BIO field trial, producing apparent crop biomass more or less similar to the corresponding mineral N reference treatment (judged visually, but also confirmed by a recent biomass cut). However, they also asked many critical questions regarding contaminants and potential health risks of these. They were surprised to learn that to date we have not been able to identify any major detrimental effects to neither the soil microbiome (genetic or functional diversity, antibiotic resistance etc.), nutrient turnover, crop quality or heavy metal accumulation, rather the contrary. This is the case even in the accelerated treatments, where doses corresponding to +200 years of normal legal annual dose of the mentioned organic wastes had been applied until now.

All in all, the LEX4BIO NDF event 2021 was very successful and gave the participants good insight into the issues and challenges of biobased fertiliser development, production, use and markets.



The CRUCIAL long-term field trial with urban Fertilising Products Regulation, was introduced by our colleague Jakob Magid, founder of the trial.



A cross-seminar with FERTIMANURE project during the Green Deal Conference, <https://greendeal2021.pl/> will be organized.

The seminar will be held on 9 December 2021, 9.00-11.00 CET, online.

Two H2020 projects that deal with the sustainable and circular management of the nutrients-rich waste are organising the joint event entitled "Bio-based fertilisers of the Future ". The main objective of the seminars is to present the scope of these two projects - LEX4BIO and FERTIMANURE. Project LEX4BIO "Optimising bio-based fertilisers in agriculture - Providing a knowledge basis for new policies" aims to develop a universal, science-based toolkit for optimising the use of BBFs in agriculture and to assess their environmental impact in terms of non-renewable energy use, greenhouse gas emissions and LCA impact (www.lex4bio.eu), while FERTIMANURE

"Innovative nutrient recovery from secondary sources – Production of high-added value FERTIlisers from animal MANURE" will obtain reliable and safe fertilisers that can compete in the European fertiliser market (www.fertimanure.eu/en).

During the seminar partners will present the results of the both projects related to technological, environmental and social aspects of the usage of BBFs.

REGISTER HERE: <https://www.lex4bio.eu/cross-h2020-seminar-register/>



A publication was written and issued by University of Natural Resources and Life Sciences Vienna (BOKU) Institute of Agronomy in September 2021:

Improving the prediction of fertiliser phosphorus availability to plants with simple, but non-standardized extraction techniques

Olivier Duboc a,b,*, Alicia Hernandez-Mora b,c, Walter W. Wenzel a, Jakob Santner b,**

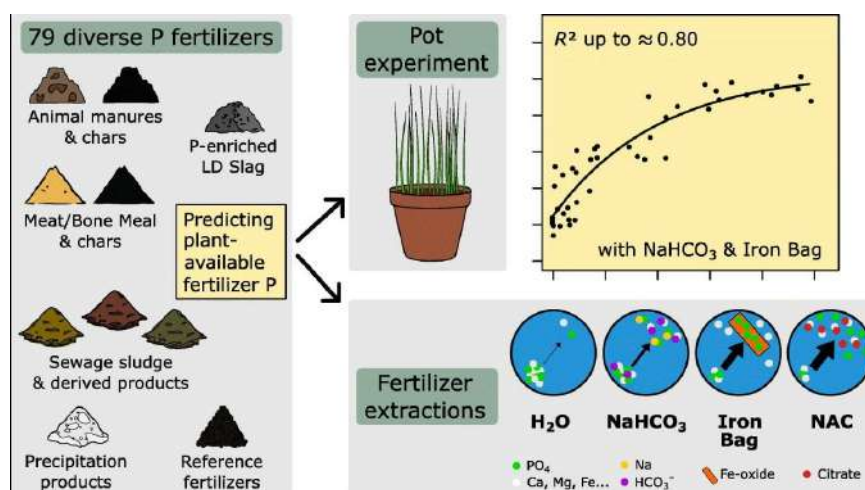
a University of Natural Resources and Life Sciences, Institute of Soil Research, Konrad-Lorenz-Strasse 24, 3430 Tulln, Austria

b University of Natural Resources and Life Sciences, Institute of Agronomy, Konrad-Lorenz-Strasse 24, 3430 Tulln, Austria

c Agrana Research & Innovation Center GmbH (ARIC), Josef-Reither-Strasse 21-23, 3430 7pTulln, Austria

The whole publication could be found here -

<https://www.sciencedirect.com/science/article/pii/S0048969721055637>.



LEX4BIO VISIBILITY in 2021 – Discover our dissemination activities

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Newsletter #4 - July 2022

Optimising bio-based fertilisers in agriculture –
Providing a knowledge basis for new policies
Get to know us!

LEX4BIO aims to identify and quantify nutrient-rich side-streams and evaluates technologies for producing safe, efficient and regionally targeted bio-based fertilisers in the EU. LEX4BIO will provide policy recommendations for achieving a higher use efficiency of bio-based fertilisers and socioeconomic improvements for the rural population.

[Click here to discover our project objectives](#)

Word from Kari Ylivainio, LEX4BIO coordinator



Second year of field trials across the EU have started in the spring of 2022. During the first growing season in 2021 bio-based fertilizers, both nitrogen and phosphorus based, showed to have a great potential to replace mineral fertilizers in various growing conditions. During the coming growing season, field days will be arranged for stakeholders to observe agronomic efficiencies of bio-based fertilizers at a field level while the evaluation of their potential risks for food and feed safety, as well as potential environmental losses of nutrients, will continue.

Bio-based fertilizers contain organic, organo-mineral and mineral fertilisers. Utilization of these fertilizers is controlled by the Fertilising Products Regulation (2019/1009) that come into force in July 2022. LEX4BIO will evaluate bio-based fertilizers against this regulation and shall provide farmers information from various types of bio-based fertilizers and their suitability across different growing conditions in the EU. Furthermore, requirement of N and P for the optimal yield will also be evaluated in order to improve farmers' economy. Stay tuned for our social media channels for up-to-date information about the project's progress.

National Dissemination Forums of LEX4BIO resumed



National Dissemination Forum in Austria, June 22

The Austrian NDF took place on the 23rd of June 2022 at the University of Natural Resources and Life Sciences (BOKU), bringing 17 participants together in a hybrid in-presence – online meeting from research organisations, agriculture chambers, fertilizer industries, water and energy service providers, environmental consultants, and the Ministry of Agriculture.

The NDF was embedded in a "Nutrient Recycling" Seminar, where othersimilar projects like Systemic, ReCaP and Nutribudget were also presented. The program included an overview of Phosphorus-recycling projects in Austria, where the floor belonged to LEX4BIO.ReCaP – Capture, recycling and societal management of phosphorus in the environment, Systemic – Circular Solutions for Biowaste and Nutribudget followed by a more subject specific presentations on results from Lex4Bio regarding P-efficiency and LCA, business cases and LCA presentation from Systemic, perspectives for other nutrients such as N, K, B. The event was closed with a discussion on the presented topics and a visit to LEX4BIO field experiment site.

Continue reading - <https://www.lex4bio.eu/2022/07/20/national-dissemination-forum-in-austria/>

LEX4BIO VISIBILITY – Discover our dissemination activities



Open Day at the University of Hohenheim (UHOH)

LEX4BIO team from the University of Hohenheim presented the field experiment and the project in an exhibition stand with flyers, fertilizer samples, posters and guided tours during an Open Day held in the beginning of July.

Follow the link to see impressions of the day and get a feel for the activities:

<https://www.uni-hohenheim.de/en/open-day>

LEX4BIO presented at Biorefine Conference in Ghent, Belgium

We are pleased to share that LEX4BIO Coordinator Kari Ylivainio presented the project at the first edition of 'The role of biorefineries in European agriculture' Conference organized by Biorefine Cluster Europe on 30 and 31 May in Ghent, Belgium. The event aims to highlight the current research innovations in the key domains of the sustainable resource management in the framework of circular economy systems. LEX4BIO project's presentation entitled 'Optimizing the use of bio-based fertilisers in crop production' provided a good overview of the project's overall objectives, work activities, objects of study as well as some of the effects of BBFs on crop production and soil parameters.



LEX4BIO at the WETSUS Phosphorus Symposium in Leeuwarden, The Netherlands

The WETSUS Phosphorus Symposium took place in May 2022 in Leeuwarden, The Netherlands, as part of the first training week for the young researchers of the ReCAP MSCA Innovative Training Network. During the symposium, experts from many EU countries gave presentations on phosphorus recovery, re-use and policy. Among them were also representatives of other EU projects such as P-TRAP (a similar network focusing on the interaction between iron and phosphorus) and LEX4BIO.

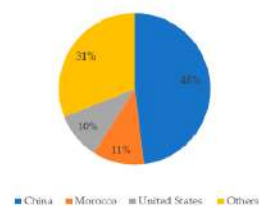
Ludwig Herrmann from Proman, who leads Work Package 6 in LEX4BIO, gave an overview of the general objectives of the project in his presentation "LEX4BIO – characterizing and optimizing bio-based fertilisers" (BBFs), and explained the concept, structure and expected results of the project. Dorette Müller-Stöver included in her presentation on "Bio-based phosphorus fertilizers – potentials and barriers" the first results of a pot experiment with 32 BBFs and wheat as a model plant, which was conducted by master student Nadine Abu Zahra in Jakob Santher's group at BOKU.

Continue reading: <https://www.lex4bio.eu/2022/05/>

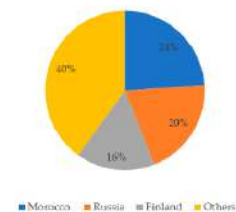
SCIENTIFIC PUBLICATIONS BY LEX4BIO

Transition to Circular Economy in the Fertilizer Sector—Analysis of Recommended Directions and End-Users' Perception of Waste-Based Products in Poland

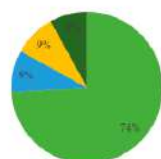
Main global producers of phosphate rock



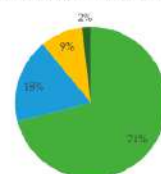
Main EU sourcing countries of phosphate rock



Main global producers of phosphorus



Main EU sourcing countries of phosphorus



A paper written by LEX4BIO partner Marzena Small, Mineral and Energy Economy Research Institute, Polish Academy of Sciences, as part of the Special Issue [Energy and Matter Recovery from Organic Waste Processing and Reuse](#)

It presents an analysis of recommended directions for the use of nutrient-rich waste in fertilizer sector and an evaluation of possible interest in this kind of fertilizer by a selected group of end-users (nurseries). The scope of

research includes the state-of-the-art analysis on circular aspects and recommended directions in the CE implementation in the fertilizer sector (with focus on sewage-based waste), and survey analysis on the potential interest of nurseries in the use of waste-based fertilizers in Poland. There are more and more recommendations for the use of waste for agriculture purposes at European and national levels. The waste-based products have to meet certain requirements in order to put such products on the market. Nurserymen are interested in contributing to the process of transformation towards the CE model in Poland; however, they are not fully convinced due to a lack of experience in the use of waste-based products and a lack of social acceptance and health risk in this regard. Further actions to build the social acceptance of waste-based fertilizers, and the education of end-users themselves in their application is required.

Read the full paper here <https://doi.org/10.3390/en14144312>

Presenting LEX4BIO to the Scientific Community

Our colleague Yan Dong from the University of Amsterdam made a poster presentation of LEX4BIO at 32nd Annual meeting of The Society of Environmental Toxicology and Chemistry (SETAC), held 15 – 19 May in Copenhagen. The title of the poster was "Simultaneous detection of pesticides and pharmaceuticals in three types of Bio-based fertilizers (BBFs) by QuEChERS-based extraction method and HPLC-QTOF/MS/MS".



SETAC is a global professional society providing a forum for individuals and institutions engaged in education, research and development, ecological risk assessment and life-cycle assessment, chemical manufacture and distribution, management and regulation of natural resources, and the study, analysis, and solution of environmental problems.

Where to meet us in September 2022?

Lex4bio will attend the **German Soil Science Society's** on-site Annual Conference, held in Trier, Germany, 5 - 8 September 2022.

We will present there the initial results of WP1 "Assessment of NRSS in the EU and their use as BBFs" with a poster entitled "Process factors affecting the contamination of struvite by selected antibiotics".

More about the event: <https://www.dbgs.de/en/Trier2022>

Networking as a key to maximise LEX4BIO impacts

Since the beginning of the LEX4BIO project, networking activities have been undertaken to ensure cross-cooperation with relevant projects and clusters at EU scale. We are glad to have joined forces with SUSFERT – a EU project developing new bio-based fertilisers to reduce dependency on unsustainable phosphorus (P) imports into the EU using struvite as a renewable source of P.



[Read more.](#)

LEX4BIO is online: From its outset, LEX4BIO project has been benefiting from a large on-line visibility. The website dedicated to the project was launched in November 2019 to provide publicly accessible information on project's goals and objectives, work activities progress and results. Over the entire duration of LEX4BIO, you will be able to download directly from our web platform, **all public deliverables and outcomes** LEX4BIO accomplished.



Follow us on social media. Visit our website.

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You are receiving this e-mail as you are part of the LEX4BIO community!

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 818309 (LEX4BIO). This output reflects only the author's view and the European Union cannot be held responsible for any use that may be made of the information contained therein.





Newsletter #5 - January 2023

Optimising bio-based fertilisers in agriculture –
Providing a knowledge basis for new policies

Get to know us!

LEX4BIO aims to identify and quantify nutrient-rich side-streams and evaluates technologies for producing safe, efficient and regionally targeted bio-based fertilisers in the EU. LEX4BIO will provide policy recommendations for achieving a higher use efficiency of bio-based fertilisers and socioeconomic improvements for the rural population.

[Click here to discover our project objectives](#)



Word from Kari Ylivainio, LEX4BIO coordinator

Year 2022 has been an unprecedented time for Europe and especially devastating for Ukraine. War in Ukraine has affected all our lives and one of the consequences is the increased price of fertilizers. This has further increased interest towards bio-based fertilizers (BBFs) and results provided by the LEX4BIO projects has gained lots of interest. We have now started the last full year of the project and the main activities are now related to evaluating the data obtained from the field, greenhouse and laboratory trials. Results have shown that there exists great potential of BBFs for replacing mineral fertilizers and thus to reduce EU's dependency on imported mineral fertilizers.

Results will be disseminated through scientific articles and conferences. Relevant stakeholders at the EU and national level will be informed about the outcomes of the project. For more information about our activities, visit LEX4BIO's webpage (www.lex4bio.eu) where you can find all the published scientific articles, conference presentations as well as accepted and submitted deliverables. By following us on social media, you will stay up to date with our on-going activities.



LEX4BIO National Dissemination Forum, Finland

Second NDF-meeting in Finland was arranged in Jokioinen on 17th of August 2022. All those stakeholders that participated the first meeting were invited to join the second meeting as well. Although not that many participants joined as compared to first meeting, Ministry of Agriculture and Forestry (MMM), agriculture advisory services (ProAgria), farmers union (MTK), fertilisers industry (YARA, Biolan), Finnish Food Authorities and biggest provider of municipal water supply and waste manager in Finland (HSY) joined the meeting. During the meeting activities and preliminary results of WPs 1, 2, 3, 4 and 5 were presented and field visit to phosphorus (WP3) and nitrogen (WP4) field sites were conducted.

[Continue reading](#)



LEX4BIO National Dissemination Forum in Denmark

The 3rd *LEX4BIO* NDF in Denmark was set up and coordinated by the University of Copenhagen (UCPH) on July 7, 2022. The EIP concept of local Operational Groups (OG) is not adopted in Denmark due to a political decision at the national level. Therefore the *LEX4BIO* national dissemination forum (NDF) in Denmark was organised differently, that is, in collaboration with the agricultural organisation SEGES (the Danish National Agricultural Advisory and R&D center). SEGES' national chief consultant in fertilisation, Torkild Birkmose, has in recent years organised a cross-sectoral *Fertilisers Network* for professionals with particular interest and responsibilities in fertilisers, fertilisation strategies and related technologies.

Read more about the event [here](#)

LEX4BIO AT NATIONAL DISSEMINATION FORUM, SWITZERLAND

On November 16, Dr. Else K. Bünemann-König, Head of the Department of Soil Sciences at the Research Institute of Organic Agriculture (FiBL), Switzerland and work package leader in *LEX4BIO* made a presentation at the Autumn Conference on Soil, Fertilizers and Environment in Olten, Switzerland entitled "Availability of nitrogen and phosphorus in commercial and recycled fertilizers – results from the EU project *LEX4BIO*: EU fertilizer regulation with product function categories and component material categories; Efficiency of bio-based fertilizers and impact on soil quality".

[Continue reading](#)

Presenting LEX4BIO to the Scientific Community

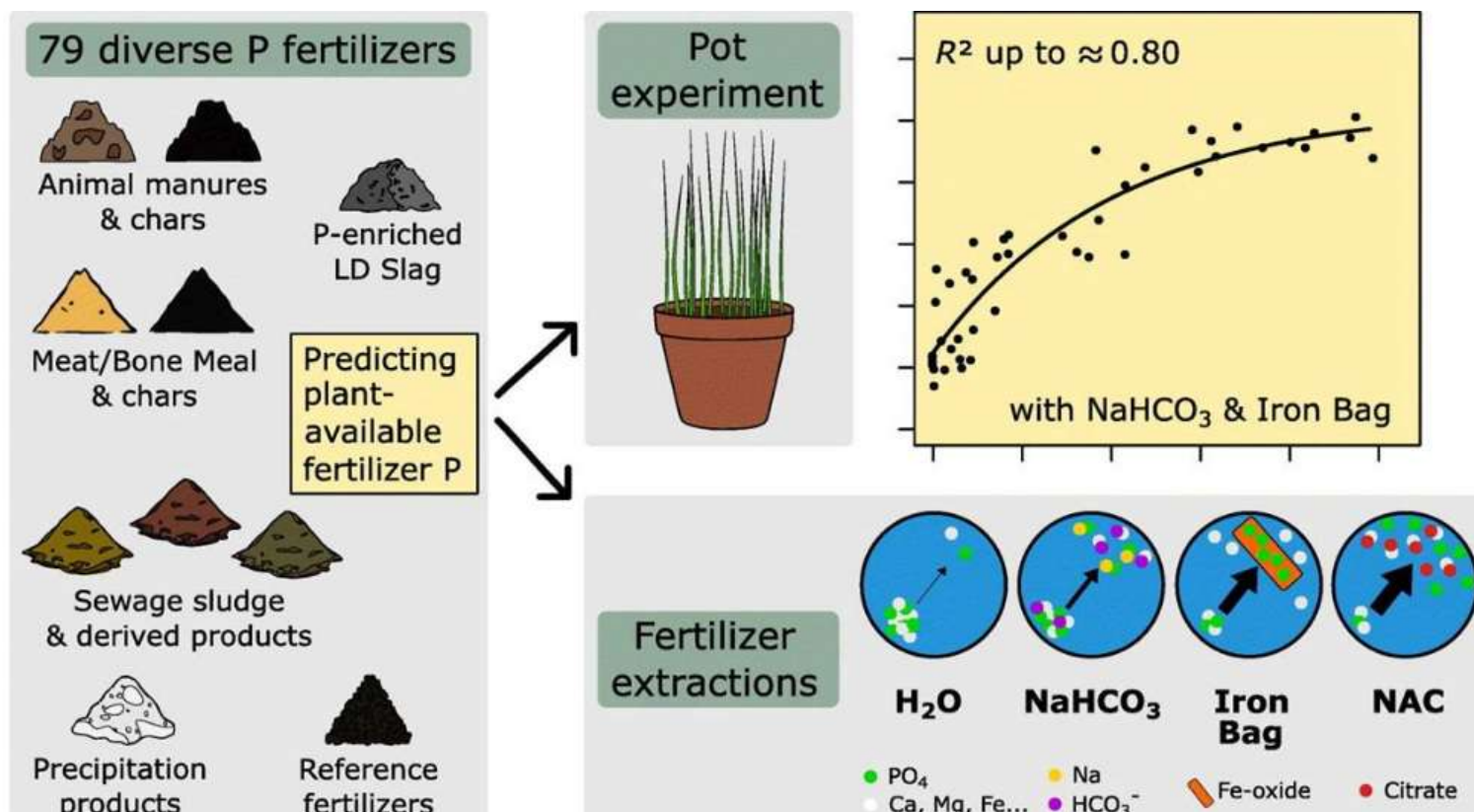
Process factors affecting the contamination of struvite by selected antibiotics - LEX4BIO poster presentation at German Soil Science Society Annual Conference, Trier, 5 – 8 September

Dr. Elke Bloem of the Julius Kühn-Institut (JKI), the German Federal Research Centre for Cultivated Plants attended the German Soil Science Society's Annual Conference, held in Trier earlier this month. As leader of LEX4BIO WP1, she presented results of the research work performed within the work package with the poster "Process factors affecting the contamination of struvite by selected antibiotics". To assess struvite as a promising fertilizer, the team examines phosphorous (P)-recovery from wastewater and sludge using four different technical procedures for the precipitation of struvite.

Download the poster [here](#).

SCIENTIFIC PUBLICATIONS BY LEX4BIO

Improving the prediction of fertilizer phosphorus availability to plants with simple, but non-standardized extraction techniques



In the framework of the [circular economy](#), new P [fertilizers](#) produced from diverse secondary raw materials are being developed using various technologies. Standard extraction methods (neutral ammonium citrate (NAC) and H_2O) provide limited information about the agronomic efficiency of these often heterogenous new products.

Continue [reading](#)

Potential ammonia volatilization from 39 different novel biobased fertilizers on the European market – A laboratory study using 5 European soils



A scientific paper by Lærke Wester Larsen, Dorette Sophie Müller-Stöver, Tapio Salo and Lars Stoumann Jensen about the risk of ammonia (NH_3) volatilization from 39 bio-based fertilizers (BBFs) was just published in the Journal of Environmental Management of Science Direct.

The key findings of the authors are that the potential NH_3 volatilization varies substantially among BBFs. The highest NH_3 volatilization potential was found from digestates and the lowest NH_3 volatilization potential from composts and struvites. The NH_3 volatilization potential from BBFs could effectively be reduced by incorporating the BBFs into soil, and the soil type had a great impact on the potential NH_3 volatilization from the BBFs.

[Follow the link to download the paper](#)

More of LEX4BIO scientific publications featured below:

Remediating Agricultural Legacy Nutrient Loads in the Baltic Sea Region

The Baltic Sea is considered the marine water body most severely affected by eutrophication within Europe. Due to its limited water exchange nutrients have a particularly long residence time in the sea. While several studies have analysed the costs of reducing current nutrient emissions, the costs for remediating legacy nutrient loads of past emissions remain unknown.

[Continue reading](#)

Phosphorus recovery and recycling – closing the loop

There is a clear and pressing need to better manage our planet's resources. Phosphorus is a crucial element for life, but the natural phosphorus cycle has been perturbed to such an extent that humanity faces two dovetailing problems: the dwindling supply of phosphate rock as a resource, and the overabundance of phosphate in water systems leading to eutrophication.

[Continue reading](#)

Predicting relative agronomic efficiency of phosphorus-rich organic residues

Relative agronomic efficiency (RAE) of phosphorus (P) in nutrient-rich residues with different chemical characteristics must be known in order to optimize their use as [fertilizers](#), to avoid underfertilization of crops or [eutrophication](#) of surface waters due to [overfertilization](#).

[Continue reading](#)

POSITION PAPER

Circular bioeconomy: tools for resilient primary production and security of supply with added value

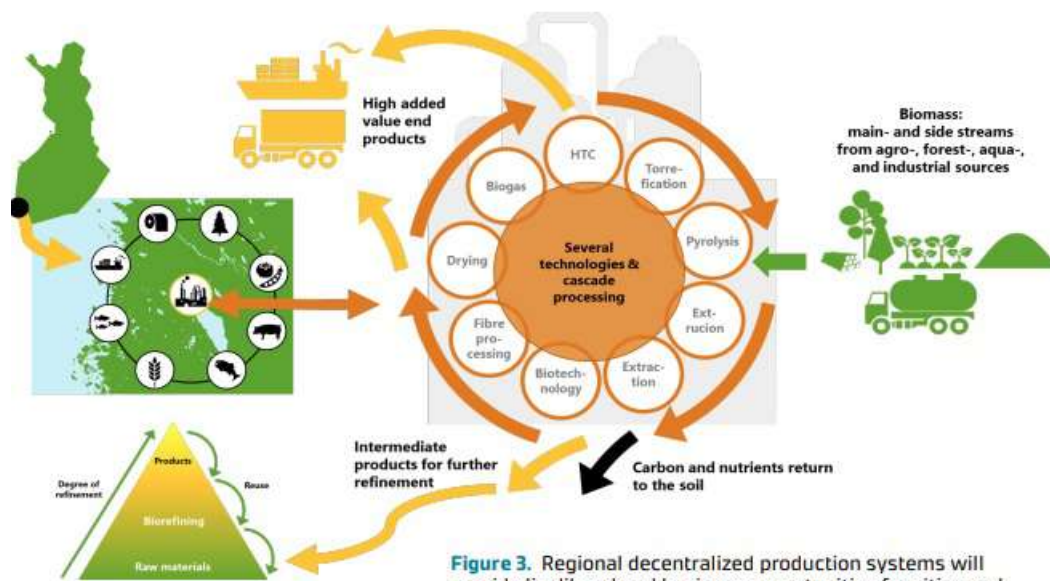


Figure 3. Regional decentralized production systems will provide livelihood and business opportunities for cities and rural communities. Comprehensive use of biomass can be achieved by cascade processing concepts.

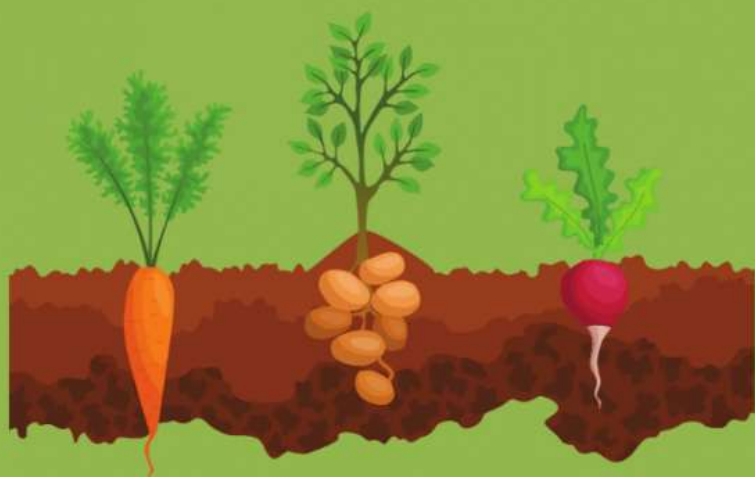
The COVID-pandemic and the recent changes in the global geopolitics have drastically increased the importance of security of supply to ensure the functionality of our societies in Europe. Improving the security of supply, especially in terms of rawmaterials and inputs for energy and food, needs both immediate actions and longer-term planning.

Read the [paper](#)

PUBLIC HEARING, DG-AGRI

REDUCING THE IMPACT OF FERTILIZERS FROM PRODUCTION TO END USE - IMPROVING THE CIRCULAR ECONOMY IN AGRICULTURE

Public Hearing, AGRI



A recognized expert in soil fertility and organic waste recycling, and partner and work package leader in LEX4BIO and Nutri2Cycle EU H2020 projects, Lars Jensen, UCPH was invited by the Committee on Agriculture and Rural Development of the European Parliament to speak at the public hearing on “Reducing impacts of fertilisers from production to end-use – increasing circularity in agriculture”, held on 29 November 2022.

[Read more](#)

Interested to learn more?

More to check out:

[Report of the Selenium Working Group 2022](#)

[Report on the legal framework governing the use of nutrient-rich side streams \(NRSS\) as biobased fertilisers \(BBFs\) – EU legislation](#)

Networking as key to maximising LEX4BIO impacts

Since the beginning of the LEX4BIO project, networking activities have been undertaken to ensure cross-cooperation with relevant projects and clusters at EU scale. We are glad to have had the chance to participate in December 2022 in a second cross-seminar with FERTIMANURE, discussing the bio-based fertilizers of the future. Another initiative LEX4BIO joined as a subgroup leader was the Nutrient Recycling Community established by Biorefine Cluster Europe and Fertiamnure project.

Cross-H2020-seminar LEX4BIO & FERTIMANURE 2022 « Bio-based fertilizers of the Future »



CROSS-H2020-SEMINAR LEX4BIO & FERTIMANURE

“Bio-based fertilisers of the Future”



FERTIMANURE



Marzena Smol

Head of Division of Biogenic Raw Materials, Mineral and Energy Economy Research Institute, Polish Academy of Sciences, Poland



Kari Ylivainio

Natural Resources Institute Finland (Luke)



Laia Llenas Argelaguet

BETA Technological Center



Ivona Sigurnjak

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Boris Jansen

University of Amsterdam Netherlands



Nicolas Estoppey

Norwegian Geotechnical Institute Norway

www.greendeal-conference.eu
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Mineral and Energy Economy Research Institute
Polish Academy of Sciences

3rd International Conference
Strategies toward
Green Deal Implementation
Water, Raw Materials & Energy

A second cross-seminar of H2020 projects LEX4BIO and FERTIMANURE was conducted as special parallel session during the 3rd International Conference “Strategies toward Green Deal Implementation: Water, Raw Materials and Energy” organized by the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences.

The seminar entitled “Bio-based Fertilizers of the Future” took place online on 7 December 2022, and enjoyed a great interest.

During the seminar, the speakers presented the scope and results of the **Lex4Bio** project: Optimizing bio-based fertilizers in agriculture – Providing a knowledge basis for new policies and **Fertimanure** – a project dedicated to the innovative nutrient recovery from secondary sources for the high-added-value fertilizers from animal manure.



LEX4BIO in Nutrient Recycling Community

In September LEX4BIO, along with Biorefine Cluster and Fertimanure project organized the first webinar of the sub-group it leads within the community - Agronomic performance of fertilising products. 12 projects dealing with BBFs had confirmed participation and provided short presentations, followed by discussion.

Who is the Nutrient Recycling Community and what do they do?

A joint initiative launched by Biorefine Cluster Europe and Fertimanure-project aiming to foster collaboration with relevant initiatives and projects in Europe related to nutrient recycling and serve as a platform to exchange knowledge and good practices:

- Clustering of Projects working on nutrient recycling.
- Identification of common challenges and needs in the field of nutrient recycling.
- Knowledge sharing and exchange to move towards common methodologies and approaches.
- Promote joint experiments and joint publications.
- Promote the preparation of new projects.
- Staff exchange through secondments or others.

Learn more [here](#).

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