Workshop Proceedings

Pathways to Impact in Sustainable Agrochemistry

3Bs Materials Conference, Lisbon | Friday 10th April 2026

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Contents

1. Workshop Introduction

About the Workshop

This workshop was held as part of the 3Bs Materials Technology Conference in Lisbon on Friday 10th April 2026. It was hosted by the AGRO4AGRI project and ran from 08:45 to 12:30 CEST, bringing together researchers, industry practitioners, and ecosystem experts to examine how innovation in safe and sustainable agrochemicals moves from early-stage research into practical agricultural use.

The workshop was structured in two parts: a morning session of four expert presentations, followed by an afternoon of two moderated expert panel discussions. The morning session was moderated by Lesley Tobin, Senior Consultant at Optimat UK. The afternoon panels were chaired by Dr Jolanta Beinarovič, also of Optimat, in her capacity as Exploitation Manager and Chair of the Innovation Committee for AGRO4AGRI.

Participants included consortium members and researchers from across the AGRO4AGRI project, industry partners and practitioners from the agritech and agrochemistry sectors, agritech ecosystem builders and venture capital representatives, and an audience drawn from the broader 3Bs Materials Conference.

Purpose of the Workshop

Why this workshop?
This session explored what it actually takes for biobased and sustainable agro-innovations to be used in practice. Through expert presentations and open discussion across projects and stakeholder groups, participants shared real-world experiences on decision-making, trade-offs, and barriers to adoption, and identified what enables innovations to move from development into everyday agricultural use.

About AGRO4AGRI

AGRO4AGRI is a Horizon Europe project developing Safe and Sustainable by Design (SSbD) solutions for plant nutrition and protection. The project combines two complementary technology platforms: controlled-release systems based on inorganic and biobased nanomaterials, and RNAi-based biocontrol technologies. Together, these approaches are designed to reduce agrochemical inputs by more than 50% while improving soil health and crop resilience.

The project operates through a 360° innovation management approach, integrating scientific excellence with societal readiness, business modelling, and stakeholder engagement. Regulatory alignment, economic viability, and societal impact pathways are embedded into the research process from day one, a practical expression of the Safe and Sustainable by Design philosophy that shaped every discussion at this workshop.

AGRO4AGRI runs for 48 months from May 2024 to April 2028, involves 12 partners across 7 countries, and has a total budget of €5.3 million, fully funded under Horizon Europe (Grant Agreement No. 101130890).

2. The Agenda

Pathways to Impact in Sustainable Agrochemistry

AGRO4AGRI

A 360° Innovation Approach from Lab to Market

Friday 10th April 2026
08.45 – 12:30 CEST

This workshop explores what it actually takes for biobased and sustainable agro-innovations to be used in practice. Through open discussion across projects and stakeholder groups, participants will share real-world experiences on decision-making, trade-offs, and barriers to adoption, and identify what helps innovations move from development into everyday agricultural use.

Agenda

08:45 – 09:00	**Arrival and registration**
09:00 - 10:50	**PART 1 – Presentations 90 mins:** **Moderator:** Lesley Tobin, Senior Consultant at Optimat
09:00 - 09:20	**Dr. Elena Usala**, Researcher at AINIA (Spain) Nanocellulose-Based Advanced Fertilizer Systems for Controlled Nutrient Release in Sustainable Agriculture.
09:20 - 09:40	**Dr. Inmaculada Ortiz**, Researcher at CTC – Fundación Centro Tecnológico de Componentes (Spain). Engineering Forest-derived Biochar as a Nanoplatform for Sustainable Nutrient Delivery in Plants.
09:40 - 10:00	**Dr. Alba Somoza Cerviño,** R&D Business Unit Process Engineer at SYSPRO (Spain). Industrial perspectives: scaling and commercialisation of bio-based agrochemicals.
10:00 – 10:30	**COFFEE BREAK AND NETWORKING**
10:30 – 10:50	**Dr. Jolanta Beinarovičа,** Senior Business Strategy Consultant at OPTIMAT (UK). Stakeholder-aligned pathways to impact and exploitation in sustainable agrochemistry.
10:50 – 12:30	**PART 2 - Expert Panel Discussions** **Chair:** Dr. Jolanta Beinarovičа, Senior Business Strategy Consultant at OPTIMAT **Panel 1:** From Frameworks to Field Decisions: Making Sustainability Actionable in Agriculture **Dr Margarida Fernandes**, Project Coordinator VINNY, CMEMS, University of Minho **Prof. Sergio Torres-Giner**, Polytechnic University of Valencia **Dr. Elena Usala**, Researcher at AINIA (Spain)) **Dr. Alba Somoza Cerviño,** R&D Business Unit Process Engineer at SYSPRO (Spain). **Panel 2**: Biobased Innovation in Practice: Stakeholder Expectations, Barriers, and Enablers **Fran Antequera**, Head of the AgriTech Hub at Misión Andalucía | Founder & President ATG SynBio Spain **Dr Margarida Fernandes**, Project Coordinator VINNY, CMEMS, University of Minho **Prof. Sergio Torres-Giner**, Polytechnic University of Valencia **Dr. Alba Somoza Cerviño,** R&D Business Unit Process Engineer at SYSPRO (Spain).

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3. Part I – Presentations & Discussions

Introduction

The morning session was opened by Lesley Tobin, who set the context for the workshop and introduced the four speakers. Participants were welcomed on behalf of the AGRO4AGRI consortium, speakers and panellists were thanked, and attendees were invited to join the AGRO4AGRI stakeholder community to receive proceedings from this and future workshops.

The morning's presentations were framed as a journey along the innovation pipeline: from fundamental materials research through engineering scale-up to commercial exploitation strategy. The four presentations were designed not as standalone talks but as a connected argument, each one adding a layer to the central question the workshop was designed to address: **what does it actually take for a biobased agrochemical innovation to reach a farm**?

Nanocellulose-Based Advanced Fertilizer Systems for Controlled Nutrient Release in Sustainable Agriculture

Dr Elena Usala | R&D Project Specialist, AINIA Technological Centre

Elena Usala
R&D Project Specialist, AINIA Technological Centre
Elena's work focuses on nanocellulose and biopolymer-based materials, from agricultural waste streams through to advanced manufacturing applications including bioprinting. She brings a hands-on perspective on translating sustainable biobased materials into practical, scalable solutions.

The problem with conventional fertilisation

Conventional fertilisers are applied in bulk and release nutrients rapidly, meaning much of what is applied is lost before plants can absorb it, leaching into groundwater, volatilising into the atmosphere, or becoming locked in the soil. The result is both an economic loss and a significant environmental burden, including eutrophication of waterways and greenhouse gas emissions from nitrogen compounds.

Controlled-release fertiliser systems (CRFS) address this by coupling nutrients to a carrier material that regulates how quickly they become available. Elena's presentation focused on using chemically modified nanocellulose as this kind of carrier: a biodegradable, non-toxic material derived from crop waste that holds fertiliser compounds and releases them gradually in response to soil conditions.

Nanocellulose as a carrier material

Cellulose is the most abundant natural polymer on Earth, found in plant cell walls. Cereal straw, a low-value agricultural by-product produced in large quantities across Europe, is rich in cellulose, making it an attractive and available feedstock. At the nanoscale, cellulose fibres have an exceptionally high surface area and can be chemically modified to carry charged groups that attract and retain fertiliser ions.

Elena's team is working with two main modification strategies: cationic nanocellulose (positive charge, attracting negatively charged nutrients) and anionic nanocellulose (negative charge, attracting positively charged nutrients such as ammonium). The modification approach depends on the target fertiliser compound. The challenge is that unmodified nanocellulose releases nutrients too quickly, surface chemistry must be adjusted through oxidation, sulfonation, or other reactions to extend the release window.

From chemistry to delivery system

The modified nanocellulose is formed into aerogels or hydrogels, porous three-dimensional matrices that can be loaded with fertiliser and placed in soil. Elena's team has developed soil column tests to measure nutrient movement through the system over time, testing against urea, potassium chloride, and monoammonium phosphate. Early results confirm that nanocellulose-based systems slow nutrient release compared to uncoated fertilisers, though further optimisation of the modification chemistry and matrix design is ongoing.

A key finding is that the success of chemical modification depends strongly on the bleaching treatment applied to the raw straw. Some modification routes that work reliably on commercial cellulose fail entirely on cereal straw-derived material unless lignin is sufficiently removed first. This reflects a broader challenge in moving from model systems to real feedstocks.

Questions and Discussion

How does this fertiliser system differ from existing slow-release products on the market? What is the specific advantage of using wheat straw nanocellulose?

Elena
The key difference is the material origin and its sustainability profile. Most existing controlled-release systems use petroleum-based polymer coatings, polyethylene, polypropylene, or PVC, which introduce microplastic contamination into the soil over time. Our system uses a biodegradable, biobased carrier derived from a genuine agricultural waste stream. EU wheat straw production is very high, so the raw material is abundant. The challenge we are working on is reproducibility, cost and scale from lab to commercial product, and that is where the collaboration with SYSPRO on the industrial process side is important.

Do the soil columns Elena uses in the lab differ from typical farmer field conditions? How comparable are the results?

Elena
We decide together, Elena and Inma, the dimensions of the columns, soil types, and use of chemicals, and try to replicate conditions between the two settings to allow comparison of results. We have met specifically to agree on soil column set-up at lab scale. At assay stage we use 1g of the delivery system in water and 3g in soil.

What are the main hurdles to bringing this to commercial scale?

Elena
Cost and scale-up are the main barriers. The cost of nanocellulose is currently high. Chemical modifications need to be optimised to achieve reproducibility, and moving from commercial cellulose to cereal straw biomass requires additional process adaptation. The question of how we engage farmers is also key, they need a practical solution and will not initially be moved by the sustainability narrative behind it.

Engineering Forest-Derived Biochar as a Nanoplatform for Sustainable Nutrient Delivery in Plants

Dr Inmaculada Ortiz Gómez | Researcher & Project Manager, Technological Centre CTC, Santander

Dr Inmaculada Ortiz
Researcher & Project Manager, Technological Centre CTC, Santander
Inmaculada holds a PhD in Chemistry and has carried out research at the International Iberian Nanotechnology Laboratory and Nova University Lisbon. Her expertise is in the design and functionalisation of organic and inorganic nanomaterials for industrial applications. She brings a rigorous materials-science perspective on how nanomaterial innovations navigate the path to real-world use.

What is biochar and where does it come from?

Biochar is produced by heating biomass in the absence of oxygen through a process called pyrolysis. The result is a charcoal-like material with a highly porous structure and large surface area, properties that make it well-suited to adsorbing and retaining fertiliser compounds. CTC has its own pyrolysis system at its facility in the Cantabria Science and Technology Park.

The feedstock CTC uses is gorse (Ulex europaeus), a thorny invasive shrub extremely common in northern Spain and Cantabria. Gorse is already being removed by land managers for ecological reasons, meaning the raw material costs little and represents a genuine waste valorisation opportunity. From 102.8g of gorse, CTC's process produces approximately 43.8g of biochar, a yield of around 42.6%.

Characterising and loading the biochar

Inmaculada showed characterisation data for biochars produced at different pyrolysis temperatures (300°C, 400°C, 500°C). Specific surface area peaks at 400°C (287 m^2/g). Higher temperatures increase the ability to adsorb urea: adsorption rate rises from 41% at 400°C to 64% at 600°C. CTC is working with industry partner MIRAT Fertilizantes to test a range of nitrogen, phosphorus, and potassium fertilisers across the system.

Release testing has been conducted in both water (conductivity measurement and UV-Vis spectrophotometry) and soil columns. Water release data shows that KCl is released rapidly within the first two hours, indicating that a coating or surface treatment will be needed for highly soluble compounds. Urea shows a slower, more differentiated release profile and is a more promising candidate for the current uncoated system.

Key conclusions

Biochar serves as an efficient nanocarrier for nutrient release. Its high surface area and cation exchange capacity enable effective nutrient retention. Laboratory-scale tests confirm that both electrical conductivity and spectrophotometric measurements are suitable monitoring tools. Impregnating fertilisers into the biochar structure extends their release time and improves assimilation by plants. The next stage is moving from water and soil column testing to plant-level validation.

Questions and Discussion

Does the choice of carrier material actually matter to a farmer or an agrochemical company?

Inmaculada
Yes, but in different ways. For farmers, the choice of carrier material matters only insofar as it affects practical outcomes such as efficacy, cost, ease of application, and compatibility with existing agricultural practices. Farmers are generally not concerned with the specific material itself, but with whether the product works reliably under field conditions and provides a clear agronomic or economic benefit.
For agrochemical companies, the carrier material is highly relevant. It directly influences formulation stability, scalability of production, regulatory approval, environmental impact, and intellectual property opportunities.

Therefore, while farmers focus on performance, companies must carefully evaluate the carrier material from both technical and commercial perspectives.

Is biochar versus nanocellulose a meaningful distinction in the field, or a technical choice that gets resolved in the lab?

Inmaculada
Biochar and nanocellulose differ significantly in properties such as surface chemistry, porosity, biodegradability, and interaction with active compounds. These differences can influence release kinetics, environmental persistence, and soil interactions. Moreover, they have distinct implications for cost, sourcing, sustainability, and regulatory acceptance.

What would need to happen for a product based on your biochar system to actually be in a farmer's hands?

Inmaculada
Several key steps would be required. The production process must be economically viable at industrial scale, with competitive pricing compared to existing products. Also, the product must comply with agricultural and environmental regulations, which may vary by region and depend on the classification (e.g., fertilizer, soil amendment, or pesticide carrier). The product must be compatible with standard agricultural equipment and practices (e.g., spraying, soil application). The system must show consistent and significant benefits under real agricultural conditions across different soils, climates, and crops. In addition, demonstration trials, extension services, and clear value propositions are essential to encourage adoption.

As with the nanocellulose work, the discussion quickly moved beyond material performance to questions of comparability, scalability, and real-world validation:

Is the biochar processed further after pyrolysis? And is particle size measured and controlled?

Inmaculada
Yes, after pyrolysis there is a washing step to remove mineral salts, and the material is then ground to obtain micro-biochar particles. Particle size is measured and characterised as part of the quality control process.

How do you measure what actually reaches the plant, what is the measure of bioavailability?

Inmaculada
We use conductivity and UV-Vis spectrophotometry for water release tests, and ICP (inductively coupled plasma atomic emission spectrometry) for soil column leachate analysis. Plant-level testing is the next stage. The soil column assay, 1g in water, 3g in soil, is a delivery system validation step before moving to plant trials.

From Lab to Pilot: Process Design and Scale-Up of Wheat Straw Nanocellulose Production for Fertilizer Delivery Systems

Dr Alba Somoza Cerviño | Process Engineer (R&D Unit), SYSPRO Automation S.L.

Dr Alba Somoza Cerviño
Process Engineer (R&D Unit), SYSPRO Automation S.L.
Alba is a chemical engineer with experience across both academia and industry, working on process design, scale-up, and formulation development. She holds a PhD that led to a patented formulation, and has

contributed to regional, national, and European R&D projects. She applies a practical, scale-up-focused lens to the question of how lab-stage innovations become deployable processes.

SYSPRO's role

Founded in 2004 with more than 180 employees across Spain, Portugal, Switzerland, and the USA, SYSPRO works across three lines of activity: GMP automation for pharmaceutical and biotech plants; engineering solutions for industrial process integration; and IT/OT digital platforms for industrial environments. Their R&D unit specifically seeks out promising early-stage technologies and applies industrial integration knowledge to bring them towards market. In AGRO4AGRI, SYSPRO is the industrial integrator: taking the nanocellulose production process developed by AINIA and designing the pilot plant that will be needed to move towards commercial production.

The four production steps and their engineering challenges

Producing nanocellulose from wheat straw involves four main steps: biomass conditioning (size reduction), alkaline pulping (breaking down lignin to free the cellulose fibres), bleaching (removing residual lignin and purifying the pulp), and refining (mechanically treating fibres to achieve nanoscale properties). Alba's presentation examined each step from an engineering standpoint, identifying where the transition from lab to pilot introduces new complexity.

The core piece of equipment is a 50-litre pulp digester, a pressure vessel in which alkaline pulping and bleaching take place. At this scale, material selection becomes critical: chemical compatibility must be verified for every component in contact with the process stream. Solid-liquid separation is more demanding than at lab scale. Foaming and clogging become real operational risks. The unloading operation requires careful safety engineering, including automatic pressure release, heat exchanger condensation of gaseous effluents, and HMI-controlled liquid discharge.

The refining step uses a disc refiner, a continuous mechanical device in which pulp, diluted to 2–8% solids content, passes between rotating discs. The disc gap is a critical control parameter: too tight and fibres are damaged; too wide and fibrillation is insufficient. The degree of refining is evaluated by monitoring energy consumption, disc gap, and rotation speed, with centrifugal recirculation allowing multiple passes.

What researchers consistently underestimate about scale-up

The friction at scale-up is almost never about fundamental chemistry, it is about scope, budget, and the physical realities of handling materials at volume. In the lab, a researcher can manually weigh, mix, and transfer small quantities of material with high flexibility. At pilot scale, every material transfer must be a designed operation with its own engineering constraints and failure modes.

Solids handling is where this most often catches researchers off guard. Powders and granular materials that are straightforward at bench scale become complex engineering challenges when they must flow through pipework, valves, and automated transfer systems. Clogging, bridging, and foaming, minor inconveniences at lab scale, can become critical process failures at pilot scale requiring entirely different equipment architectures.

Water use is a related design challenge: nanocellulose production requires significant volumes for washing, and the disc refiner operates on dilute suspensions. Water recirculation must be designed into the system from the start. The pilot plant is expected to be ready by the end of 2026.

Questions and Discussion

SYSPRO takes the raw material and processes it. What stage of development does a technology need to reach before you can engage with it?

Alba
We need to reach a relatively low TRL, small pilot scale is enough for us to start. The constraint is not the TRL so much as the budget. The pilot plant will not be ready until the end of 2026.

What are the biggest physical challenges in the digester step specifically?

Alba
Hurdles and densities. Wheat straw overflows in the pulp digester. Solids are harder to handle than liquids, this is the single most consistent thing that researchers underestimate about scale-up.

The process requires cellulose at around 2% concentration, or the refiner clogs. And the process needs a lot of water. How do you balance that water demand with environmental goals?

Alba
You design recirculation into the system from the beginning. We are designing the pilot plant to recirculate process water as much as possible, rather than treating it as a one-pass resource.

Are there existing industrial innovations in the equipment that could make this easier?

Alba
The equipment itself is already used in industry; disc refiners are established technology. The challenge is adapting the process conditions to protect fibre integrity. We just need to ensure fibres don't get damaged during the process.

Extended Q&A: On what researchers get wrong about scaling up

You described SYSPRO's approach as taking technologies at a low level of development and bringing them to market. In practice, what does the conversation look like when you have to tell a researcher that something isn't ready, or won't work at scale in the way they think it will? And what is the single most common thing researchers get wrong when thinking about what it will take to scale up their work?

Alba
In reality, these conversations are often less about rejecting ideas on technical grounds and more about aligning expectations. We typically work with research centres and universities that already have strong experience in applied projects, so the starting point is usually quite solid. The main friction point tends to be scope and budget rather than feasibility. Many concepts are technically sound at lab scale, but when you translate them into an industrial environment, the question becomes what is realistic within the available resources, timelines, and infrastructure. Another key aspect is scaling through automation and control. At industrial scale, automation is essential not only for efficiency but also because it enables continuous monitoring of process variables, which in turn improves optimisation, reproducibility, and process simulation.

What researchers most commonly underestimate about scaling:
Processes that are straightforward at lab scale become significantly more complex when scaled up due to physical handling and logistics constraints.

- In the lab, movement of materials is often manual, flexible, and informal. At scale, transport becomes a designed subsystem with its own constraints, costs, and potential failure points.
- Solids handling is a classic example. Powders or granular materials can be weighed, transferred, and mixed manually at bench scale, but at industrial scale this requires dedicated equipment, careful flow design, and often entirely different process architectures. Issues like clogging or foaming become critical.

Stakeholder-Aligned Pathways to Impact and Exploitation in Sustainable Agrochemistry

Dr Jolanta Beinaroviča | Senior Business Strategy Consultant, Optimat; Exploitation Manager & Chair of the Innovation Committee, AGRO4AGRI

Dr Jolanta Beinarovič
Senior Business Strategy Consultant, Optimat; Exploitation Manager & Chair of the Innovation Committee, AGRO4AGRI
Jolanta specialises in technology commercialisation across life sciences, agriculture, and engineering biology. With a PhD in synthetic biology and over five years supporting innovators with investment readiness and market strategy, she has worked with more than 140 companies. She brings a sharp, practical perspective on stakeholder-aligned pathways to impact.

The core argument: exploitation planning is not a project endpoint

Jolanta's central argument was that exploitation planning should be woven into a research programme from the beginning, not deferred to the final months of a project when the science is done. Stakeholder priorities should shape both the evidence that gets generated and the strategy for putting that evidence to use. Without this, research programmes routinely produce outputs that are scientifically valid but commercially or regulatorily unready.

Why different stakeholders need different evidence

Jolanta presented a stakeholder value framework identifying three key groups in agricultural innovation adoption, industry, end users (principally farmers), and regulators, and mapping each group's current problems, barriers to innovation uptake, and the evidence they need before they will commit.

Industry evaluates through a commercial lens: can this become a product? What does the cost structure look like? Is it manufacturable at scale? Does it fit existing supply chains? Is there a demand signal? Most research outputs are not designed to answer these questions, yet without satisfactory answers, industry partners will not commit. For industry, the measure of success is predominantly monetary: return on investment.

Farmers evaluate through a practical and economic lens: does it work reliably in my fields? Is it cost-effective? Will it integrate with my existing equipment and practices? Sustainability credentials matter less to farmers than performance and return on investment. Agronomic effectiveness data from field trials in similar conditions is the currency that moves them. For farmers, success is measured in yield metrics and cost per hectare.

Regulators evaluate through a safety lens: is it demonstrably safe for non-target organisms, for soil and water, for human health? What does the environmental fate look like? Regulatory evidence requirements are specific, demanding, and time-consuming to generate, and research projects rarely budget for them explicitly. For regulators, success is measured in carbon, time, and mortality metrics.

From evidence to value proposition

Scientific metrics, adsorption rates, release kinetics, zeta potential measurements, are not directly meaningful to any of these three groups. What matters is whether the evidence can be framed in terms of outcomes each group cares about. For industry: reliable, reproducible manufacturing at competitive cost, clear IP, and a differentiated product claim. For farmers: yield uplift per hectare, input cost reduction, operational simplicity. For regulators: a coherent safety dossier with environmental fate data, ecotoxicology results, and human health risk assessment.

Implications for AGRO4AGRI

Stakeholder value mapping should be an ongoing activity within AGRO4AGRI, updated as the science develops, with the evidence generation plan shaped by what each stakeholder group will in fact need. The afternoon panel discussions were designed as a live test of this principle: bringing together the people who need to say yes with the researchers developing the science and asking both sides to be honest about where the gaps are.

Questions and Discussion

Across the previous presentations, it became clear that many of the barriers being discussed - cost, scalability and reproducibility – are exactly the questions that stakeholders ask but are rarely framed that way during research.

Who is actually responsible for SSbD compliance across the value chain? The framework assigns different concerns to different stakeholders, but who owns SSbD?

Jolanta
That is exactly the tension. SSbD is currently framed as a researcher's responsibility, it sits in the grant requirements and the research design. But if it doesn't translate into language that industry and farmers understand, it stays in the lab. The framework is designed to force that translation question early.

How do you get farmers involved without alienating them? They are often suspicious of EU-funded research projects.

Audience
Farmers need ownership. The projects worth promoting are the ones where the end user is already involved and can communicate the problems from the beginning. Cooperatives work well as an entry point; they offer the economic incentive farmers need and give them a share of ownership in the outcome.

A question to all four presenters: Jolanta, you've argued that thinking about exploitation and impact should happen alongside the research, not after it. But looking at researchers who are very much in the middle of their projects, I wonder how realistic that actually is in practice

Jolanta
We ask a lot of our researchers - to be experts in science, to communicate it to different audiences, to win R&D funding, to teach students, and so on. It is perhaps important to acknowledge that the researchers should not be expected to also singlehandedly spearhead impact planning in terms of commercialisation planning and other activities. We need more people in our teams whose direct responsibility is to bring everyone's outputs and together and translate science into impact. Here in Horizon projects we call these people exploitation managers, some universities call these people entrepreneurs in residence - the principle is the same. It is a standalone role that weaves together the story of technology on its route to impact.

Elena, Inma, Alba - are you already having those conversations? Are you thinking about farmers, regulators, and commercial partners while you're still optimising materials in the lab? And Jolanta, when you work with early-stage projects, what's the one thing you wish researchers understood earlier about the journey from discovery to real-world impact?

Jolanta
From my perspective, I would wish researchers would feel more empowered to have broader conversations about their technology with non-technical audiences. Often, we are in a bit of a bubble, often talking to ourselves rather than delivering messages to where they truly matter - be it end users, regulators, policymakers, or even industry and investors. There is a bit of a language barrier in communicating to different stakeholder groups that can only be addressed by ongoing dialogue and education of all parties

Cross-Cutting Insights from the Morning Session

The four presentations, taken together, produced a consistent set of observations about what it takes to move sustainable biobased agrochemicals from research into practice.

Key Themes from Part 1

- Biobased carriers, nanocellulose from cereal straw and biochar from forest residues, offer a credible sustainable alternative to petroleum-based polymer coatings in fertiliser delivery, but require significant chemical and process development to achieve controlled release profiles at commercially relevant scales.
- The lab-to-pilot transition is not simply a scaling problem, it requires rethinking process architecture, especially around solids handling, material compatibility, and automation. This

is the single most consistent underestimation researchers make when moving from lab to scale.

- Water use is a material environmental concern at pilot scale: recirculation systems must be designed in from the start, not retrofitted.
- Stakeholder alignment cannot be deferred to the commercialisation phase because it shapes what evidence gets generated. Industry, farmers, and regulators each require different types of evidence, framed in different terms, and research programmes must plan to generate it.
- Exploitation planning should run in parallel with research, structured frameworks that map stakeholder priorities to evidence generation plans are more likely to produce market-ready outputs than research that addresses adoption as an afterthought.
- Farmers evaluate innovations on performance and cost, not sustainability credentials. The sustainability story must be reframed as an economic or practical benefit to gain traction at field level.
- Feedstock choice matters beyond chemistry: gorse and wheat straw are both genuine waste streams with no competing uses, which shapes the economics and sustainability argument for the materials derived from them.

4. Part II: Expert Panel Discussions

Chair: Dr Jolanta Beinarovičа | Optimat UK

Purpose of the Panel Discussions
The panel discussions build directly on the morning's presentations. Where Part 1 asked 'what is the science and what does it take to scale?', Part 2 asks 'what happens when it meets the real world?'. Panellists were chosen to bring different vantage points on the same central question: what in practice needs to happen for biobased agrochemical innovation to reach a farm? They were not asked to present polished positions but to engage honestly with the tensions, trade-offs, and gaps that the morning had surfaced.

Panel 1: From Frameworks to Field Decisions

Making Sustainability Actionable in Agriculture

The Panellists

Dr Margarida Fernandes
Professor & PI, CMEMS, University of Minho; Project Coordinator, VINNY (Horizon Europe)
Coordinating a large-scale Horizon Europe consortium with SSbD embedded across the full pipeline from lab to field trials, Margarida brings first-hand experience of what it costs, in time, resources, and scientific trade-offs, to make sustainability frameworks work in practice rather than on paper.

Prof. Sergio Torres-Giner
Professor & Ramón y Cajal Researcher, FoodUPV, Polytechnic University of Valencia
With over 20 years spanning academic research and industrial R&D, Sergio brings an unusually grounded perspective on what the journey from lab to commercial viability looks like in practice, including where the evidence generated by science and the evidence needed by industry consistently fail to connect.

Dr Elena Usala
R&D Project Specialist, AINIA Technological Centre
Working at an early stage of the nanocellulose pipeline, cereal straw extraction, soil column testing just beginning, Elena spoke from the coal-face of applied research, offering an honest account of how sustainability frameworks feel when the science is still forming and the practical questions are still open.

Dr Alba Somoza Cerviño
Process Engineer (R&D Unit), SYSPRO Automation S.L.
As the person responsible for translating laboratory processes into pilot-scale reality, Alba brought an engineering lens to the discussion, grounded in the specific challenges of materials handling, process design, and what it takes for a technology to be worth an industrial investment.

Discussion Summary

Opening question: Does SSbD actually shape the work?

The panel opened with the question of whether the Safe-by-Design framework genuinely shapes research decisions at early stages, or whether it is written into grant applications and then navigated around when real decisions have to be made.

Chair → Elena	"At this point in your work, does the SSbD framework actually shape what experiments you run and what questions you prioritise? Or does it feel more like something that will matter later, once the science is further along?"
Elena	People aren't conscious enough about SSbD. There is a need to improve communications and change behaviour, a shift from a publishing focus towards a company perspective. When starting a project in the lab, the framework prompts thinking about what is safe, sustainable, simple, and cost-effective in terms of resource use. Sustainability frameworks have reshaped how success is defined in agriculture. In the past, research focused mainly on functionality; today, it must also work in a sustainable way. As a result, during research we adapt processes to be as sustainable as possible—for example by selecting greener reagents or solvents, reducing quantities, optimizing reaction times, and limiting the number of process steps. However, moving toward sustainability also brings challenges such as higher costs, scale-up constraints, and unclear criteria. This often requires compromises between research goals and industrial feasibility, adapting the framework to real-world industrial conditions.
Chair → Margarida	"At what point in a project's life does SSbD start changing decisions rather than just framing them?"
Margarida	I was aware of SSbD within Horizon Europe. It used to be about being close to the market but with SSbD we have to address it. It's important that all scientists know about SSbD. SSbD was embedded from the beginning of VINNY, not just as a Horizon Europe requirement but as a genuine strategic choice. It has, however, created real friction: greener solvents can create compromise, and the use of plastic material in the lab is an area needing attention. The framework sometimes pulls against scientific logic, and the cost, in time, resources, and scientific trade-offs, is real.

Question 1: Where frameworks influence decisions vs. where they don't

The panel explored when sustainability frameworks genuinely alter decisions versus when they function more as compliance overhead.

Chair → Margarida	"VINNY has SSbD embedded from the beginning, nanotoxicology, regulatory alignment, environmental fate testing running alongside the science. Was that a genuine strategic choice, or something the Horizon Europe call required? Has it ever created real friction, moments where the sustainability framework and the scientific logic pulled in different directions?"
Margarida	Industry decides on certain things. When we apply the model, we have to decide if we have all the information AND the money. Those two constraints shape every real decision. Greener solvents can create compromise. We also use a lot of plastic material in the lab; we need to think about how we can reduce plastic. It is important that all scientists know about SSbD.

Chair → Alba	"When you are designing a scale-up process, what does a researcher need to demonstrate before you are convinced a technology is worth the engineering investment?"
Alba	It decides. This includes industry and users, when we apply the model in practice, the framework becomes a filter that both enables and constrains choices at the scale-up stage. We try to apply SSbD principles by considering sustainability and safety from the early development stages. For pilot plants in particular, we design equipment with simple instrument connections so components can be easily removed and recycled after the pilot phase. However, because these projects often have limited budgets and short operational lifetimes, full sustainability optimization is not always practical.

Question 2: What evidence genuinely changes minds?

The panel was asked what kind of sustainability evidence actually moves commercial partners and farmers, and what is produced in good faith but rarely used by the people it is meant for.

Chair → Sergio	"You've spent 20 years with one foot in academia and one foot in industrial R&D. What kind of sustainability evidence effectively changes minds in industry, and what kind is generated in good faith but rarely used by the people it's meant for?"
Sergio	The government decides on certain guidelines that involve industry and end users. When we apply the model, we have to decide if we have all the information and the funding. I have to ask 'Do I have all the LCA information?', 'Is the quality good enough for consistency?'. There are a lot of unknowns and things that we cannot control.
Elena	I believe transparency is the key principle in what genuinely changes minds today. We've clearly shifted from a "trust me" mindset to a "show me the data" approach. Different stakeholders respond to different kinds of evidence: farmers and agronomists want to see real world performance, often validated locally or by peers; industry partners need proof of scalability, robustness, and economic viability; regulators require documented evidence of safety and sustainability, usually formalized through certifications or standardized assessments.

Chair → Alba	"When you are designing a scale-up process, what evidence from the lab would actually tell you what you need to know to make those decisions confidently?"
Alba	Even if you don't have all the information, you may discover something that is not SSbD, for example water usage. Sustainable is in line with economic viability. We try to look for solutions but have to go with what is cost-effective. Different stakeholders respond to different types of evidence. Industry partners are mainly convinced by practical and economic arguments; for example, waste valorization projects are usually attractive because they can turn a disposal cost into a source of value, but only when there is proven feasibility at scale and a clear short-term ROI. Regulators, in contrast, respond more to compliance and safety evidence, and I would argue that regulation and legislation should actually be the main driver of change: if you introduce clear limits on the use of traditional chemicals, it becomes much easier for industry to justify and invest in the transition.

Question 3: When sustainability and practicality conflict

Panellists were asked to respond to a scenario: a biobased controlled-release fertiliser that performs well in the lab but costs three to four times more than the synthetic alternative. Farmers in the target region are working on very thin margins. When environmental performance and cost-effectiveness pull in opposite directions, which wins?

Chair	"When environmental performance and cost-effectiveness pull in opposite directions like this, what happens in practice? Which one wins?"
Sergio	Sustainable resources will be more expensive, but we have to look at the long-term. We have to decrease environmental impact and increase brand viability. How can we speed up the process? That depends on regulation. We are not ready to leave petroleum and solely use a biorefinery. We need to be prepared. Governments need to take decisions and invest with tax reductions. Regulation can drive change, for example stopping polystyrene in packaging. Regulation will speed up this process
Alba	This is a very common trade-off in practice. Even if a biobased or more sustainable option clearly outperforms on environmental criteria, if it is not economically viable it is very difficult to implement at scale, because industry decisions are ultimately cost-driven. In reality, these cases are usually resolved in favour of the cheaper conventional alternative unless there is strong regulatory pressure or some form of market incentive. From a research perspective, the main goal must be to reduce this gap and develop solutions that are both sustainable and economically competitive.
Elena	In practice, these trade-offs are usually solved in a practical way. If a biobased option costs much more, companies often choose the cheaper solution unless there is regulation, customer pressure, or a clear long-term benefit (such as lower risk or better image). Often the solution is a compromise: partial replacement, small pilot projects, or gradual improvements to reduce costs. Should it be done differently? Probably yes. Sustainability is still seen as a limit instead of a real advantage. A better approach would consider environmental impact, future regulations, and long-term risks from the start, so sustainability and business goals are balanced early, not only at the end.
Chair → Margarida	"Is that the right answer? Or is the framework supposed to protect us from making that trade-off the wrong way?"
Margarida	The solutions that exist now – the biosolutions are difficult to bring to the level of chemical inputs. If there aren't leachable products, we can market them nicely. Maybe we should try the influencers' approach to encourage usage. If we mix all the dimensions: science, regulation, marketing, we can speak their language and create impact. It's a complex problem.

Question 4: What would you change about the frameworks?

If panellists could change one thing about current sustainability frameworks to make them more useful in real agricultural innovation, what would it be?

Chair	"If you could change one thing about current sustainability frameworks to make them more useful and more usable in real agricultural innovation, not in theory, but in practice, what would it be?"
Alba	Need to change how we approach industry. They won't get money being sustainable alone. We can help them by showing how to reduce costs and make money by using waste etc. Change the conversation with industry.
Elena	Not simple to change the mindset of society. If you have money, you have power. Need to translate the sustainability problem into language that end users understand. Improve communication. I would make sustainability frameworks more practical and operational. Many are too high-level for day-to-day work, so adding clear criteria, simple metrics, and decision tools would help people apply them in real projects.
Sergio	We have the problem of translation to consumers. 50% of people don't know how to recycle, compost, or use the right bins. Need to educate people, we can start with school education. Nothing is wrong with the model.
Chair	Sustainability isn't a separate thing, it's a cross-cutting theme.

Audience Input

Audience	Discussion needs to move from researchers to policy makers. More discussion and communications needed.
Margarida	In VINNY, doing living labs that join all the people together, farmers, local government is effective. We can apply policy and directives through initiatives like the Lighthouse and living labs. Raise awareness. There is a generational change underway.
Audience	There is the issue that sometimes biobased has to be so far processed that it is not sustainable. The material might be sustainable, but the process might not be.
Sergio	The LCA will tell you, and you can demonstrate it, but this is hard for the scientists.

Key Themes from Panel 1

- SSbD frameworks are not yet sufficiently embedded in early-stage research behaviour, communications and cultural change are needed.
- The most credible sustainability evidence for industry is economic: how does this reduce costs or increase brand value?
- Regulation is a critical enabler: examples like polystyrene bans in packaging show that regulation can accelerate adoption faster than market forces alone.
- LCA is a powerful tool but is currently hard for scientists to produce credibly and for industry to use confidently.
- Translation is the central challenge: sustainability must be reframed in the language of each stakeholder group, farmers, industry, end users.
- Biobased does not automatically mean sustainable: the process matters as much as the material.
- Scaling up is primarily a logistics and engineering challenge, not just a chemistry one, physical handling, automation, and process architecture require dedicated design.

- Living labs that bring farmers, local government, and researchers together show genuine promise for multi-stakeholder alignment.

Panel 2: Biobased Innovation in Practice

Stakeholder Expectations, Barriers, and Enablers

The Panellists

Fran Antequera
Head of AgriTech Hub, Misión Andalucía; Founder & President, ATG SynBio Spain
Having accelerated over 30 agritech startups and built Spain's national synthetic biology association, Fran brought a candid market perspective, including what researchers typically get wrong about timelines, farmer needs, and what it takes to attract a commercial partner.

Dr Margarida Fernandes
Professor & PI, CMEMS, University of Minho; Project Coordinator, VINNY (Horizon Europe)
Returning from the research-focused discussion, Margarida shifted focus to what managing incentive alignment across 12 partners from academia, industry, and SMEs in seven countries actually looks like, a live experiment in the stakeholder management challenges the panel was designed to explore.

Prof. Sergio Torres-Giner
Professor & Ramón y Cajal Researcher, FoodUPV, Polytechnic University of Valencia
Returning from Panel 1, Sergio turned his attention to the commercial and market side, drawing on his industrial R&D background to examine cost structures, value chain incentives, and what it would actually take for a biobased product to compete commercially with synthetic alternatives.

Dr Alba Somoza Cerviño
Process Engineer (R&D Unit), SYSPRO Automation S.L.
Returning from Panel 1, Alba refocused on the industry-facing side of SYSPRO's work, where the process of taking technologies from low TRL towards market regularly surfaces the barriers and misalignments that the panel discussion put under scrutiny.

Discussion Summary

Opening: Expectation gaps between research and market

Panel 2 opened with the observation that misaligned expectations are often where the problems begin. Fran was asked what researchers most commonly get wrong when their innovations meet the market.

Chair → Fran	"You've accelerated over 30 agritech startups and seen what happens when promising biobased innovations meet the market. What are the expectations that researchers most commonly arrive with that turn out to be wrong, about timelines, about what farmers want, about what it takes to get a commercial partner interested?"
Fran	Cooperatives work; they offer money. We should share ownership. Involving the end user too late, and arriving with our own solutions rather than theirs, is the core error. Different stakeholders do not only have different expectations — they also define value differently. Farmers are usually asking whether a solution is reliable and especially cost-competitive, easy to use and worth the risk in real conditions. Industry and manufacturers may focus more on manufacturability, integration and portfolio fit. Very much in line with Alba's point, I think it is also crucial that a new solution fits well enough into the practices and systems already in

	use, because switching costs are often very high. That applies not only to manufacturers and supply chains, but also to farmers' own routines and decision-making in the field. For me, one key point is that the value of a biosolution is not the technology itself, but the improvement it creates in practice. If we frame innovations too much through the technology and not enough through the concrete outcome, we risk overestimating how ready the market is.
Sergio	We have basic science projects and applied science projects. How do you move the results to industry? Such a small impact. The projects we should promote are the ones where the end user is already involved and can communicate the problems. If they are already involved from the beginning, it will be more effective, and you can pursue continuity. End users will benefit. Industry will increase brand value and competitors cannot compete. Include industry and end users from the start. We need more players: researchers, industry, farmers. Someone in the middle who will talk to them all. Farmers want a solution and may not care about sustainability. Need to involve all players in the consortium. In the lab, we cannot think about these problems. Need gap-filling people. Whose responsibility is it?
Alba	We have a department that works with industry. When we talk to industry, they don't like change. If we show that we will invest if they implement the change, that convinces them. Different stakeholders generally expect biobased agro-innovations to be sustainable, cost-competitive, and easy to implement within existing systems. In practice, however, short- to medium-term reality is often different: these technologies are still maturing, they typically come with higher costs initially, and there are significant challenges in scaling and integration into established industrial or agricultural processes.
Fran	In farming, the costs are huge. If you have the data and can demonstrate that it works, how do you get them to adopt it? Workers breathing ammonia, demonstrating how to repurpose the ammonia, that is identifying their problems. That is the key.
Chair	Are we addressing the right problem in the right way? Farmers usually throw everything at a pest regardless. We just need to speak to them.
Margarida	If a farmer has a demonstrator site or field trial, we can convince them. VINNY has different fields for field trials.

Question 1: Incentive structures and risk-sharing

This question was given significant time as the most structurally interesting in the panel. Fran had specifically requested that the panel address incentive structures and risk-sharing mechanisms, which he sees as a core barrier to adoption that is often underexplored.

Chair → Fran	"Misaligned incentives across the value chain are often a more fundamental barrier to adoption than the technology itself. Can you give us a concrete example of where incentive misalignment killed an innovation that was technically ready?"
Fran	Scientists and farmers speak different languages. Farming is about trust, while scientists should have contacts who are end users. A lot of adoption slows down because the actor expected to change is often also the one carrying most of the risk. In agriculture, that is very often the farmer.

	More effective alignment would mean earlier involvement of end users, more evidence generated under real conditions, and making sure the solution fits existing practices and supply chains well enough to be realistically adopted. It should also involve creating the right economic incentives, so that trying a new solution feels at least as viable as sticking to what is already working. A lot also depends on **trusted** intermediaries. **Cooperatives**, for example, can be extremely important because they already have direct access to farmers and, crucially, their trust. They are often in a much better position than a startup or project consortium to introduce products, suggest better practices and reduce perceived risk. I would say something similar about technicians, respected early adopters and, increasingly, credible agro influencers.
Chair	Whose responsibility is SSbD? Balance a good product with scalability costs. This is the most challenging part. Different stakeholders will want to know different things.
Alba	Incentive misalignment. Policy and regulation should be aligned.
Chair → Sergio	"You understand cost structures in a way that most academic researchers don't. Where do the incentives currently point in the value chain, and where do they need to be redirected for adoption to become realistic?"
Sergio	Policy. How to disseminate our projects and communicate to society. Industry wants to sell the product, so we need to tell the consumer what the better product is. We have to communicate. There is radio, TV, social media. How do we reach the end user? With packaging and marketing? Industry wants to sell the product so we need to tell the consumer what the better product is.
Chair	And there is a risk of failure for industry in taking up new products.
Fran	There are mixed feelings about policy. Farmers don't think EU projects help them anymore. There should be money put into cooperatives. There should be public incentives. Have to use examples to show efficacy.
Sergio	Need a catalyst to move things through the value chain. In business, second players have had the path broken and trail blazed.
Chair→ Margarida	In business, the second players have had the path broken for them. What incentives are there? For example, in Ireland there are tax reliefs. Sticks vs carrots, tax reductions. Within a Horizon Europe consortium you're already managing incentive alignment across 12 partners. What mechanisms have you found actually work to keep everyone pulling in the same direction when commercial interests and research interests diverge?"
Margarida	In Portugal there are already tax incentives. And there are projects between industry and academia.
Alba	Also important to incentivise universities. They need funding. They are not rewarded for dissemination. Governments should ask: how much of your work is translated to industry?

Chair	And what can genuinely work to support this?
Sergio	We have basic science projects – applied science. So how do you move results to industry? The projects we should promote are the ones where the end user is already involved and can communicate the problems. If they are already involved from the beginning, it will be more effective and you can pursue continuity. End users will benefit. Industry will increase brand value. The competitors cannot compete. We must include industry and end users.

Question 2: The hardest single barrier

Each panellist was asked to name the single hardest barrier to adoption of biobased agro-innovations right now, not a list, just one.

Chair → all	"I'm going to ask each of you to name the single hardest barrier to adoption right now, not a list, just one. The one that, if you could remove it tomorrow, would make the biggest difference."
Sergio	When we apply the model, we have to decide if we have all the information AND the money. Those two constraints together.
Alba	LCA information: do I have all of it? Is the quality good enough for fundraising? A lot of unknowns and things we cannot control. The main barriers to adoption are primarily economic, followed by technical scale-up challenges, and behavioural resistance to change. In practice, if a process is already working and economically stable, companies have little incentive to switch, since they tend to avoid unnecessary risk and uncertainty. I think regulation is the most powerful tool for change: if there is a clear legislative push that restricts traditional options, it forces and accelerates the transition, making it easier for industry to justify investment and adopt new solutions.
Fran	I agree that economic, technical and regulatory barriers are all important, but I'd add that in practice they tend to reinforce each other. In agriculture especially, switching costs are often much larger than they look: they are not only financial, but also operational and psychological. Farmers are not just making a purchase decision; they are making a risk decision. What has genuinely worked, in my view, is trusted validation under real conditions, solutions that integrate smoothly into existing workflows and supply chains, and enough clarity for the rest of the system to move

Question 3: What genuinely works, and what should stop?

Chair → Alba	"What should collaborative research projects like AGRO4AGRI stop doing if they're serious about impact beyond the project lifetime? Not what they should do more of, what should they stop?"
Alba	Need to change how we approach industry. Show them how to reduce costs and make money by using waste etc. Collaborative projects should assign clear responsibility for exploitation and real-world uptake, instead of treating it as something shared by everyone but owned by no one. A dedicated work package combining technical, sustainability (e.g. LCA), regulatory and industry expertise could focus on translating results into actionable solutions and keeping continuous contact with end users and policy makers. Otherwise, a lot of outputs risk staying in a "limbo" without effective transfer beyond the project.

Fran	One example I often think about is a project built around insect traps that worked technically quite well. But in practice many growers were already applying preventive pesticides regardless of actual pest pressure. So although the technology solved a real biological problem, it was not really changing the grower's decision logic. The innovation worked, but it did not change the behaviour that mattered.
Chair	Need marketing and a regulatory push.
Margarida	In VINNY, doing living labs that join all the people together, farmers, local government. Apply policy and directives, Lighthouse, living labs etc. Raise awareness. There is a generational change.
Additional comments	On lasting impact beyond the project
Fran	I strongly agree that impact and exploitation need clearer ownership. I would just add that projects should stop treating adoption as something that happens at the end. Too often, projects optimise for deliverables rather than diffusion. If lasting impact is the goal, then evidence generation should be shaped from the start around what different stakeholders actually need to trust, validate and adopt the solution.

Key Themes from Panel 2

- Misaligned incentives across the value chain are a more fundamental barrier to adoption than the technology itself.
- End users (farmers, industry) must be involved from the very beginning of a project, not consulted after the science is done.
- Farmers need ownership of innovations, not just access to them, cooperative models that share economic benefit show real promise.
- Regulation is both a barrier and an accelerant: targeted regulatory intervention can move markets faster than persuasion.
- Incentive structures currently fail universities: researchers are not rewarded for translating their work into industry impact.
- The 'gap-filling person', someone who speaks the language of researchers, industry, and farmers simultaneously, is consistently missing from consortia.
- Demonstrator sites and field trials are among the most effective tools for convincing farmers.
- Projects that genuinely move results to industry are those where end users are embedded from day one and can articulate the problems the research needs to solve.
- Public incentives (tax reliefs, grants for industry-academia collaboration) matter but require clear evidence of efficacy to build farmer and industry trust.

Closing Synthesis

The Chair closed both panels with the following observation:

> *"What I've heard across both panels is that the gap between scientific readiness and market adoption is not primarily a technical problem, it's a problem of evidence, incentives, communication, and timing. The science in this room is genuinely impressive. The question this workshop is designed to answer is what it takes for that science to reach a farm. I don't think we've fully answered that today, but I think we've asked it more honestly than it usually gets asked.*

Cross-Cutting Observations Across Both Panels

A consistent set of structural challenges emerged across both panel discussions:

- Communication as infrastructure: every panellist returned to the need for better translation between scientific, regulatory, commercial, and end-user communities. This is not a soft problem, it is structural.
- Incentives determine outcomes: who bears the risk, who captures the value, and who is rewarded for dissemination shapes what gets done and what gets buried.
- Timing is under-discussed: sustainability frameworks embedded at the beginning of a project produce different outcomes than those applied at the end. So does end-user involvement.
- Regulation is an underused lever: targeted regulatory intervention consistently emerged as the most credible mechanism for accelerating adoption at scale.
- The gap-filling role: there is a consistent missing actor in most research-to-market journeys, someone who bridges researcher, industry, and farmer, and whose incentives are aligned with the outcome rather than the output.
- Scaling is harder than it looks: the challenges at industrial scale are not just technical, they are logistical, architectural, and organisational, and researchers consistently underestimate them.

Appendix A: Speaker and Panellists' Biographies

Dr Elena Usala

R&D Project Specialist, AINIA Technological Centre

Area of Expertise

Research in biomaterials with a focus on biopolymers for advanced applications in regenerative medicine, environmental remediation, and agricultural solutions. Specialist in nanocellulose: surface modification and applications across sustainable materials platforms.

Key Contributions

- Development of nanocellulose-based materials from agricultural waste for high-value applications
- Design of functional hydrogels for cartilage and nerve tissue regeneration
- Fabrication of antimicrobial aerogel membranes for water purification
- Optimisation of bioinks and evaluation of cell viability for bioprinting applications
- Multiple peer-reviewed publications on biomaterials and nanocellulose

Perspective Brought to the Workshop

An interdisciplinary perspective bridging chemistry and materials science, integrating sustainable material development with advanced manufacturing techniques. Particularly focused on translating biobased materials into practical solutions, contributing both a circular economy approach and expertise in functional material design.

Dr Inmaculada Ortiz Gómez

Researcher & Project Manager, Technological Centre CTC, Santander

Area of Expertise

Design, synthesis, and functionalisation of advanced organic and inorganic nanomaterials, with particular emphasis on sustainable optical biosensors and plasmonic nanostructures for food safety and conductive surface fabrication.

Key Contributions

- PhD in Chemistry, University of Granada, Spain
- Postdoctoral research at the International Iberian Nanotechnology Laboratory (INL), Braga, Portugal, developing sustainable carbon nanoparticle-based biosensors for food safety
- Research stays at Nova University Lisbon and CENIMAT, specialising in plasmonic nanostructure synthesis
- Project Manager for Work Package 3 of the AGRO4AGRI project at Technological Centre CTC

Perspective Brought to the Workshop

A rigorous nanomaterials perspective on how advanced synthesis and functionalisation approaches enable real-world industrial applications, with direct experience managing the translation of research outputs within a major European agrochemistry project.

Dr Alba Somoza Cerviño

Process Engineer (R&D Unit), SYSPRO Automation S.L.

Area of Expertise

Process design, optimisation, and scale-up of chemical and biochemical systems, with experience across CCUS, enhanced oil recovery, ionic liquids, waste valorisation, polymeric construction materials, and surfactant formulations.

Key Contributions

- PhD in Chemical Engineering, including the development of a patented formulation

- Experience spanning academia and industry in specialty chemicals, construction materials, and home and personal care
- Contributions to formulation development and industrial scale-up across multiple sectors
- Participation in regional, national, and European R&D projects on resource recovery and sustainable processes

Perspective Brought to the Workshop
A combined academic and industrial perspective focused on translating innovation into scalable processes, with particular insight into the engineering and commercial trade-offs that arise at the bench-to-plant transition.

Dr Jolanta Beinarovič
Senior Business Strategy Consultant, Optimat; Exploitation Manager & Chair of the Innovation Committee, AGRO4AGRI

Area of Expertise
Technology commercialisation across life sciences including agriculture, biotechnology, and engineering biology. Specialist in due diligence, business planning, investment readiness, and market analysis, working at the interface of science and business.

Key Contributions
- PhD in synthetic biology
- Over five years of experience in commercialisation support services for deep-tech and life sciences companies
- Supported more than 140 companies with due diligence of technical and commercial plans
- Expertise in helping scientists, investors, policymakers, farmers, and companies communicate and collaborate effectively
- Serves as Exploitation Manager and Chair of the Innovation Committee for the AGRO4AGRI consortium

Perspective Brought to the Workshop
A practical, cross-stakeholder perspective on the pathways from scientific innovation to commercial and societal impact in sustainable agrochemistry, grounded in direct experience navigating the gap between research potential and market adoption.

Fran Antequera
Head of AgriTech Hub, Misión Andalucía; Founder & President, ATG SynBio Spain

Area of Expertise
Synthetic biology and biosolutions at the intersection of agrifood systems, venture building, and ecosystem development.

Key Contributions
- Leads a regional AgriTech Hub accelerating 30+ startups and facilitating open innovation between corporates, farmers, and research institutions
- Founder of Spain's national synthetic biology association, building bridges between startups, industry, investors, and policymakers
- International collaboration in biotechnology and bioeconomy ecosystems including engagements with NATO, U.S. biotech leadership, and European clusters
- Currently leading implementation of the EIT Food Seedbed Venture Catalyst on behalf of Ivoro Ventures

Perspective Brought to the Workshop
A systems-level perspective on how biobased innovation transitions from laboratory potential to practical agricultural adoption, with particular focus on stakeholder alignment, incentive structures, and scalable pathways to impact.

Dr Margarida Fernandes

Professor & PI, CMEMS, University of Minho; Project Coordinator, VINNY (Horizon Europe)

Area of Expertise

Advanced functional materials, nanoencapsulation, and antimicrobial systems at the intersection of chemistry, biotechnology, and sustainable agrochemistry.

Key Contributions

- Coordinates the VINNY consortium, a €8.3 million Horizon Europe project with 19 partners from 10 countries targeting a 50% reduction in pesticide use across European vineyards
- Pioneering stimuli-responsive nanobiopesticide formulations releasing active ingredients in response to environmental triggers
- Overseeing an end-to-end translational programme from in vitro testing through to field trials in Portugal, Spain, Austria, and Denmark
- Author of over 91 publications with more than 3,400 citations

Perspective Brought to the Workshop

A bench-to-field perspective on what it actually takes to move a biobased agrochemical innovation from laboratory proof-of-concept into real vineyard practice, grounded in the live experience of coordinating a large, multi-country, multi-stakeholder Horizon Europe consortium.

Prof. Sergio Torres-Giner

Professor & Ramón y Cajal Researcher, FoodUPV, Polytechnic University of Valencia

Area of Expertise

Sustainable polymer technologies for food preservation and agri-food applications within the Bioeconomy and Circular Economy, with particular expertise in nanoencapsulation, electrospinning, and biobased materials.

Key Contributions

- Over 20 years of experience spanning public research institutions and industrial R&D organisations
- Holder of the Ramón y Cajal research fellowship, Spain's most prestigious individual research contract
- Recipient of the inaugural Progress in Polymer Science Scholar Award 2025
- Author of over 174 publications covering biobased and biodegradable polymers, encapsulation technologies, and circular economy materials

Perspective Brought to the Workshop

A materials-to-market perspective on how biobased encapsulation technologies move from scientific proof-of-concept into practical, scalable use, combining the technical rigour of a polymer scientist with the commercial literacy of someone with deep industrial R&D experience.