



Issue 40

July 30, 2026

NEWSLETTER

Smart & Net-Zero Project

The Smart Net-Zero (SNZ) project team under the Food and Fertilizer Technology Center (FFTC) for the Asian and Pacific Region regularly collects and shares information related to sustainable agri-food systems and climate-smart agriculture, including research, news, policy, data and event updates around the world on the project website.



Overview

When Ecology Meets Engineering: Securing Pollination for Agrifood Systems

Human land use has altered 53% of Earth's terrestrial surface, with agricultural land projected to expand a further 10% by 2030, pressuring the pollinators that sustain global food production. This issue's **Research** asks whether ecological conservation and technology can jointly safeguard pollination services. The featured review study finds ecological intensification (EI) — replacing chemical inputs with biodiversity-based practices — generally benefits pollinator diversity though gaps remain in long-term landscape effects, pollinator thresholds for yield, and financial returns. Four supporting research build on this: a Hungarian field experiment operationalizes EI restoration at landscape scale; a 30-site Europe-Africa meta-analysis supplies the long-term yield evidence the review lacks; a global review broadens the lens beyond bees to non-bee and nocturnal pollinators sustaining local food security; and a robotic pollination system for apples offers a technology-based alternative. Together, they show pollination support requires both ecological restoration and viable technology to keep pace with mounting land-use pressure.

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RESEARCH

01 Theme: Others; Policy Incentives, Financing, Pricing

Ecological intensification to mitigate impacts of conventional intensive land use on pollinators and pollination

March 27, 2017 | [Ecology Letters](#) |

Introduction: Human land use has already altered roughly 53% of Earth's terrestrial surface, and agricultural land is projected to expand a further 10% by 2030, intensifying pressure on pollinators even as solutions reconciling conservation with food production remain underused. This review and synthesis by an European led research team asks whether ecological intensification (EI) — replacing chemical inputs with biodiversity-based ecosystem services such as intercropping, crop rotation, and reduced agrochemical use — can reverse pollinator decline.

Key findings: Most EI practices reviewed have positive effects on pollinator diversity and abundance, supporting EI as a viable alternative to conventional intensification. Landscape-scale management, rather than farm-scale action alone, better improves pollinator habitat availability but requires coordination among farmers' land-use decisions. **Three knowledge gaps are identified: long-term effects of land-use change on pollinator communities are poorly understood; the minimum pollinator diversity needed to sustain crop yield and wild-plant reproduction is unclear; and EI's financial costs, benefits, and return on investment remain insufficiently documented.** The authors review agri-environment schemes, the EU's Ecological Focus Areas, and US Farm Bill programs (e.g., EQIP), noting a shift toward "**payment by results**" as a promising but untested instrument. They call for regionally tailored solutions, stronger farmer-scientist-policymaker dialogue, and integration of agricultural, ecological, economic, and social science to scale EI globally.

02 Theme: Others; Policy Incentives, Financing, Pricing

Improving ecosystem services in farmlands: beginning of a long-term ecological study with restored flower-rich grasslands

June 20, 2022 | [Ecosystem Health and Sustainability](#) |

Introduction: Grassland restoration research lacks landscape-scale studies, long-term monitoring of successional processes, and diverse native seed mixtures, particularly in Central and Eastern Europe. A Hungary-based research team led by the Centre for Ecological Research launched a long-term field experiment in 2020 to address these gaps. The study established 0.5 ha wildflower parcels using 32 local insect-visited plant species across 24 circular landscape plots (500 m radius) in Central Hungary, with homogeneous and heterogeneous landscape contexts, to test landscape-scale effects of restoration on crop yield, pollination, and pest control.

Key findings: Two years after establishment, sown vegetation shifted from weed-dominated cover in year one to the target flowering species in year two, and the parcels are now attracting a diverse pollinator community, including wild bees and butterflies. The monitoring protocol combines biannual botanical surveys with pollinator transects and malaise traps in late May and late July, trap-nests for cavity-nesting bees and wasps placed at 80 m intervals up to 400 m from each plot to capture landscape-scale effects, and pan traps (24 per plot, 576 in total) exposed for 48 hours each July. As a "beginning" narrative, the paper reports study design and early establishment rather than statistical yield or biodiversity outcomes; those results will accumulate through continued monitoring. The authors intend the protocol as a replicable model demonstrating that diversified farmland can maintain yield while restoring biodiversity, feeding evidence into policy frameworks such as the EU Green Deal and the UN Decade on Ecosystem Restoration.



Figure | The overview of a wildflower strip in a homogeneous landscape (left) shows its island-like setting. A malaise trap is set out for a week in one of the wildflower parcels and targets most flying insects (right).

03 Theme: Others; Policy Incentives, Financing, Pricing

Long-term evidence for ecological intensification as a pathway to sustainable agriculture

June 27 2022 | [Nature Sustainability](#) |

Introduction: Whether ecological intensification (EI) can maintain crop yields while reducing reliance on nitrogen fertilizer (NF) and tillage intensity (TI) has lacked robust long-term evidence. An international, interdisciplinary research group applied meta-analysis to data from 30 long-term experiments across Europe and Africa, comprising 25,565 yield records, to test how EI practices, specifically increasing crop diversity and adding fertility crops and organic matter, interact with NF and TI in shaping staple crop yields.

Key findings: EI practices generally had positive effects on staple crop yields, confirming their viability as a sustainable pathway. EI's yield benefit was largely substitutive with nitrogen fertilizer: EI substantially increased yield at low NF doses but had minimal effect at high NF doses, indicating an optimal NF level that is generally lower where EI is applied. Manure had the strongest substitution effect, allowing most or all NF to be removed without yield loss. Reducing tillage intensity produced, on average, a statistically significant 4% yield reduction — small relative to overall yield variability in the dataset, though outcomes varied by tillage type (e.g., basins performed slightly better than more intensive tillage, while shifting to zero-till slightly reduced yields). Crop residue retention showed no measurable effect on yield. The authors conclude EI can contribute meaningfully to future sustainable farming systems, particularly where synthetic fertilizer use is reduced, though effects vary by context and further long-term trials are needed to resolve tillage-related uncertainty.

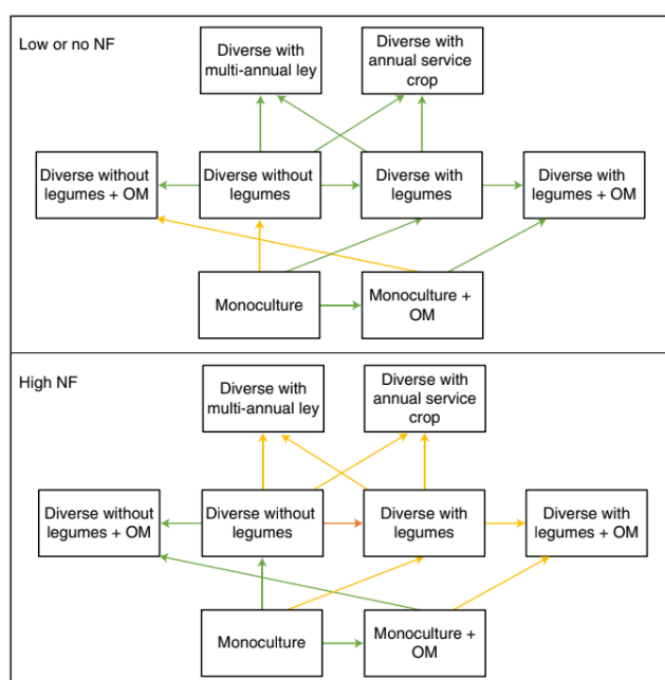


Figure | A summary of the EI practices and combinations thereof that increase yields, have no effect on yields or may risk a yield decrease when implemented in either a low or high NF context.

04 Theme: Others

Bee and non-bee pollinator importance for local food security

February 2023 | [Trends in Ecology & Evolution](#) |

Introduction: Pollination research has historically focused on bees and globally traded crops, leaving the contribution of non-bee pollinators and locally important crops unclear. This study led by French researchers from Université Paris-Saclay reviewed 154 published studies on floral visitors across 83 crops, spanning 39 countries, to assess the diversity, conservation status, and role of bee and non-bee pollinators for crops of global market importance versus crops of local cultural, nutritional, and economic value.

Key findings: After excluding 67 studies (44%) that sampled bees only, the review found bees accounted for 91% of recorded pollinator occurrences, followed by Diptera (67%), Lepidoptera (44%), Coleoptera (33%), non-bee Hymenoptera (25%), and Hemiptera (18%); bats and birds also contributed, especially to tropical crops. Non-bee pollinators were more frequent visitors of locally important crops than globally traded ones, and were the only recorded floral visitors for crops including banana, calabash, langsat, petai, and snake gourd. The authors conclude that securing yield for locally important crops cannot rely on bees alone. They flag that nocturnal pollinators remain especially understudied due to diurnal-biased sampling — for example, 27 coleopteran and 6 lepidopteran species were identified as potential nocturnal pollinators of oilseed rape, sunflower, ridge gourd, and bottle gourd, yet current monitoring methods rarely capture them — and call for expanded monitoring of non-bee population trends, resilience to land-use change, and contribution to local food security, particularly in the Global South.

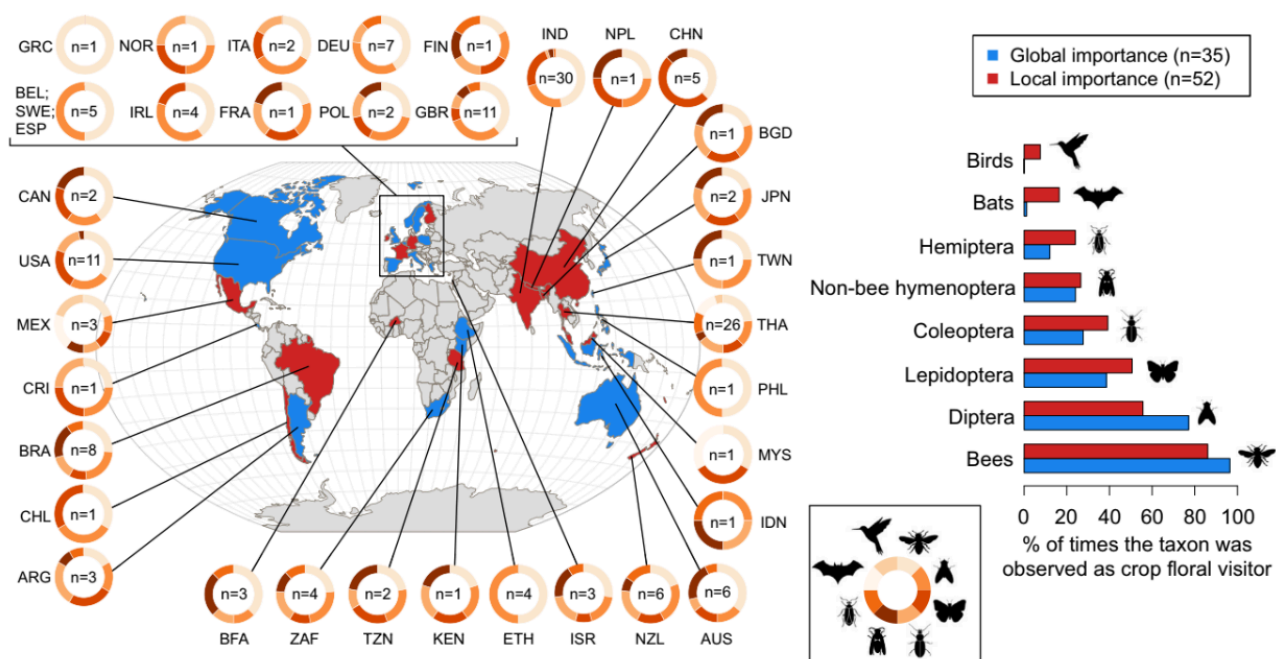


Figure | Global synthesis of crop pollinators reveals shared high-level diversity of non-bee species, including not only Diptera, Coleoptera, Lepidoptera, non-bee Hymenoptera, Hemiptera, but also non-insect pollinators, such as bats and birds, with differences between species groups for crops with global food market importance and those of importance for local people.

A vision-based robotic system for precision pollination of apples

March 9, 2025 | [Computers and Electronics in Agriculture](#) |

Introduction: Declining natural pollinators due to climate change, habitat loss, and pesticide use threaten yields of pollination-dependent tree fruit crops. Researchers from Washington State University (USA) developed and field-tested a robotic pollination system for apples, integrating a machine-vision system to detect flower clusters with a robotic manipulator and electrostatic sprayer applying charged pollen suspension. The system was evaluated in lab conditions and then in commercial Honeycrisp and Fuji apple orchards, benchmarked against natural pollination.

Key findings: The machine-vision system achieved a mean average precision of 0.89 in identifying flower clusters, with an operational cycle time of 6.5 seconds per cluster. In Honeycrisp apples, robotic pollination at 2 g/l pollen concentration achieved a fruit set of 34.8% of sprayed flowers (87.5% of clusters with at least one fruit), versus 43.1% (94.9% of clusters) under natural pollination. In Fuji apples, performance dropped markedly — 7.2% fruit set (20.6% of clusters) versus 33.1% (80.6% of clusters) naturally — indicating cultivar-specific factors such as tree canopy structure and orchard age affect outcomes. Fruit quality (color, weight, diameter, firmness, soluble solids, starch content) was comparable between methods regardless of the fruit-set gap. The authors conclude robotic pollination is a promising, if still developing, supplementary strategy for orchard pollination, and call for further refinement of machine vision, spray parameters, and cultivar-specific calibration before broader field deployment.

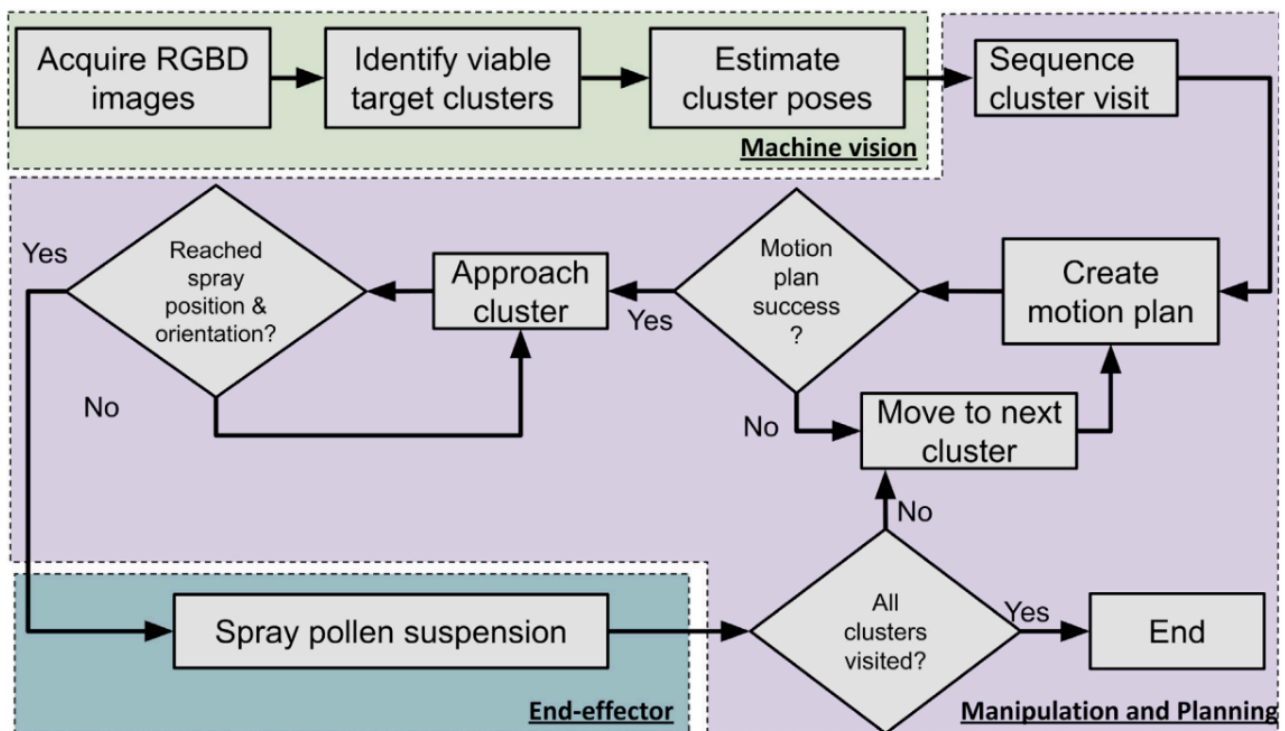
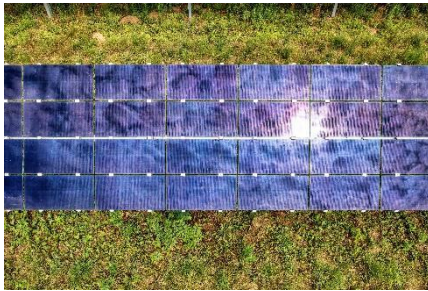


Figure | Overall flowchart of the proposed robotic pollination system. The system included a machine vision system with a RGB-D camera and image processing pipeline, alongside a mechatronic system with robotic manipulator, motion planning algorithms and an electrostatic sprayer-based end-effector system.

NEWS

01 THEME: GHG Emission Reduction; Policy Incentives, Financing, Pricing

The pathways to a net-zero futureMay 22, 2026 | [World Fertilizer](#) |

The fertilizer and farming sectors account for roughly 1.3% of global CO₂ emissions, with ammonia production alone emitting an estimated 450 million tonnes annually, per a World Fertilizer special report. Producers are cutting energy use in the Haber-Bosch process through advanced reforming and new catalysts, while shifting toward larger-scale carbon capture and sequestration (CCS) and green ammonia. Nutrien's Redwater,

Canada plant captures roughly 300,000 tonnes of CO₂ per year via CCS, and CF Industries and Japan's JERA are building a US\$4 billion blue-ammonia plant in Louisiana, due online in 2029. Policy is reinforcing this shift: the EU's RED III mandates 42% renewable hydrogen in fertilizer production by 2030, Canada targets 2050 net zero for agriculture, and China aims to cut agricultural nitrogen emissions up to 48% by 2060. Fertilizers Europe's roadmap estimates full decarbonization will need hundreds of billions of dollars in CCS infrastructure over the next 25 years.

02 THEME: Policy Incentives, Financing, Pricing

FAO urges open trade on all agricultural inputs and efficient fertilizer use amid global food production risksJune 8, 2026 | [Food and Agriculture Organization \(FAO\)](#) |

Opening the FAO Council's 181st Session, FAO Director-General warned that the prolonged closure of the Strait of Hormuz — a chokepoint for roughly 20-30% of global fertilizer exports and other energy shipments — poses a global food security risk. As the crisis reaches its 100-day mark, effects are becoming increasingly visible, driving mainly a fertilizer and production shock rather than an immediate shortage. FAO is calling for

open trade, no export restrictions on agricultural inputs, protected humanitarian food corridors, and alternative logistics routes, alongside longer-term measures such as soil mapping, precision agriculture, intercropping to cut nitrogen fertilizer dependence, and innovation funds for green ammonia and biofertilizers. Its Global Emergency and Resilience Appeal, launched in December 2025 to reach 100 million people, had received only US\$206 million of its US\$2.5 billion target by end-May, with FAO separately mobilizing US\$564 million in voluntary contributions this year.

03 THEME: Policy Incentives, Financing, Pricing; GHG Emission Reduction

Iran war forces farmers to seek fertilizer alternatives from cow dung to compost

May 31, 2026 | [AP News](#) |

Since Iran's war began on February 28, disruption to Strait of Hormuz shipping has driven fertilizer prices up 40-50%, per World Bank and IFPRI data, pushing farmers across Africa, Latin America, and Asia toward organic alternatives. In Senegal, farmer Abou Sow has used compost and herder manure for eight years and now recruits others, as the government subsidizes 30,000 tonnes of organic fertilizer. Brazil's biofertilizer sector grew 15% in 2023-2024 despite importing over 80% of its fertilizer. India launched a "national mission" on May 10 to cut chemical fertilizer use 50% through natural farming, already adopted by 1.7 million farmers in Telangana and Andhra Pradesh. FAO chief economist and other experts say the crisis is accelerating practices that also cut farm emissions and boost soil carbon, though scaling remains constrained by existing chemical-fertilizer subsidies, as in Mexico.



04 THEME: MRV (Measurement, Reporting, Verification)

IRRI joins global effort to modernize GHG measurement guidelines for rice

June 2, 2026 | [International Rice Research Institute \(IRRI\)](#) |

IRRI joined rice and climate researchers from FAO, AfricaRice, IRTA, the Alliance of Bioversity International and CIAT, and NARO at a writeshop hosted by Japan's JIRCAS in Tsukuba (April 7-10, 2026), supported by the Global Methane Hub, to draft updated global guidelines for measuring greenhouse gas emissions from rice systems. The effort updates 2015 Asia-focused guidance to reflect new technologies and field experience, addressing inconsistencies in chamber design, sampling, quality control, and flux calculation that limit comparability across national GHG inventories, most of which still rely on coarse Tier 1 approaches that fail to capture the diversity of rice ecosystems and management practices. Participants agreed on weekly sampling as a baseline standard, reviewed emerging tools such as trace gas and photoacoustic analyzers, and set metadata and FAIR data reporting requirements. The draft distinguishes minimum from recommended measurements for resource-constrained institutions and may feed into future IPCC reporting.



05 THEME: MRV (Measurement, Reporting, Verification); ICT in Agrifood Sustainability

Vietnam pioneers digital scoring tool for nation's low-emission rice program

May 28, 2026 | [International Rice Research Institute \(IRRI\)](#) |



IRRI, the Vietnam Rice Industry Association (VIETRISA), and Can Tho City's Department of Agriculture and Environment piloted ViRiCert, a digital compliance-scoring tool, across 11 cooperatives under Vietnam's 1-Million-Hectare low-emission rice program. The tool scores farming practices — including water management, mechanized sowing, fertilizer application, and straw management — against the program's technical criteria to award the "Vietnam

Green and Low-Emission Rice" trademark and support traceability and growing-area codes. Can Tho became the first Mekong Delta locality to apply the tool; three cooperatives were recognized for early compliance. VIETRISA has so far certified about 70,000 tonnes of exported rice under the trademark, currently issued free of charge, with a licensing fee under consideration once certified volume reaches 500,000-1,000,000 tonnes. The pilot is supported by the World Bank, CGIAR, and Taiwan's ICDF CABIN project.

06 THEME: MRV (Measurement, Reporting, Verification); Policy Incentives, Financing, Pricing

Taiwan Tea Research and Extension Station successfully guides first batch of carbon-labeled products

June 12, 2026 | [Economic Daily News \(經濟日報\)](#) | (In Chinese)



Taiwan's Tea Research and Extension Station, under the Ministry of Agriculture, guided a tea farmer and Taiwan Agriculture and Forestry's Sun Moon Lake tea factory to complete the island's first carbon footprint verification for tea products, resulting in carbon labels. Officials said the certification builds a low-carbon production benchmark, helps growers optimize cultivation and processing, and improves consumer recognition of green products. The station provided one-stop guidance covering inventory boundary-setting, data collection, and emission-factor

application, substantially lowering the application threshold and cost burden for farmers and processors, and plans to extend the model to other major tea-growing regions, alongside efforts to align with government green-procurement policy and build a lower-carbon supply chain for export markets.

07 THEME: MRV (Measurement, Reporting, Verification); GHG Emission Reduction

Taiwan's first-ever floral carbon audit: Carbon footprint of *Phalaenopsis* orchid seedlings revealed

June 10, 2026 | [Central News Agency \(CNA\)](#) | (In Chinese)

Taiwan's Floral Industry Innovation Center, under the Ministry of Agriculture, completed the island's first carbon footprint inventory for cut flowers, using *Phalaenopsis* orchids — Taiwan's leading floral export — as the model crop. The assessment found a 2.5-inch orchid seedling carries a carbon footprint of 0.4 kg CO₂-equivalent. Researchers developed a dedicated calculation tool, identifying emission hotspots across the production process, and the methodology has already been transferred to industry. Taiwan exports more than 80% of its orchid production, worth an estimated NT\$5 billion annually, supplying roughly one in three orchids traded globally, primarily as seedlings. The inventory gives the sector a quantified baseline to support emissions management and strengthen competitiveness as international markets increase disclosure requirements for carbon and environmental product information.

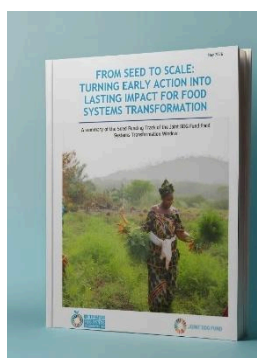


POLICY

01 THEME: Sustainable Production

From Seed to Scale: Turning Early Action into Lasting Impact for Food Systems Transformation

UN Food Systems Coordination Hub / Joint SDG Fund | [Source](#) | [Report](#) |



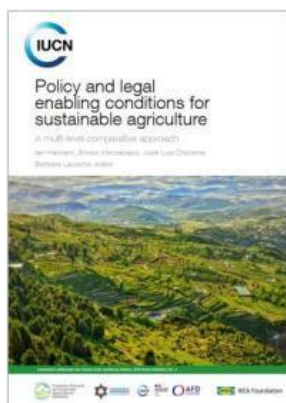
Between 2024 and 2025, the Joint SDG Fund's Food Systems Transformation Window channeled its Seed Funding Track — roughly USD 250,000 per programme over 12 months — into 12 countries (Cambodia, Costa Rica, Egypt, El Salvador, Jordan, Kenya, Rwanda, Samoa, Serbia, Tanzania, Uganda, and Vietnam), demonstrating that modest, time-bound investment can unlock policy reform and strengthen institutional coordination before larger-scale financing becomes viable.

The report frames fragmented policy landscapes and unclear institutional mandates as the main barriers to food systems transformation, which seed funding is designed to resolve by clarifying mandates, costing national priorities, and generating evidence. Country results include Cambodia's digitalized monitoring and evaluation framework and financing strategy, Tanzania's National Food Systems Planning and Budgeting Tool (2025-2030) with gender-responsive budgeting, Uganda's integration of 80% of identified priorities into its forthcoming National Development Plan, Jordan's value chain strategies embedded in its National Food Security Action Plan, and El Salvador's Healthy Eating Law. Rwanda, Jordan, and Kenya have already transitioned from Seed funding to the Fund's High Impact Track, which mobilizes larger, systemic investment in six additional countries (Bolivia, Ethiopia, Nigeria, Somalia, Tajikistan, and Timor-Leste). The report positions policy coherence and institutional readiness — not large loans — as the binding constraint on food systems transformation.

02 **THEME:** Climate Smart Agriculture; Nature-based solutions

Policy and Legal Enabling Conditions for Sustainable Agriculture: A Multi-Level Comparative Approach

International Union for Conservation of Nature (IUCN) | [Source](#) | [Report](#) |



Part of IUCN's Common Ground on Food and Agricultural Systems series, this report comparatively assesses the international, regional, and national law and policy frameworks needed to support sustainable agriculture, aimed primarily at policymakers, government officials, and legal scholars, especially in developing countries. It frames the urgency in stark terms: around 40-44% of the Earth's land surface is already used for agriculture, and the global food system is the primary driver of biodiversity loss worldwide. At the international level, the Rio Conventions (UNFCCC, CBD, UNCCD) offer the strongest legal opening for embedding sustainable agriculture, particularly through the Global Biodiversity Framework's 2050 pathway and National Biodiversity Strategies and Action Plans, while

non-binding instruments such as the SDGs, the Sendai Framework, and Codex Alimentarius provide complementary but less enforceable guidance. At the regional level, the report traces the EU's Common Agricultural Policy through the European Green Deal and Farm to Fork Strategy. At the national level — illustrated through case studies of Brazil, Germany, Kyrgyzstan, Uganda, and Viet Nam — it recommends grounding Nature-based Solutions (NbS) directly in land-use planning and zoning law, alongside updated water and soil conservation, disaster risk management, and food safety frameworks, and calls for Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), and NBSAPs to be more fully leveraged to accelerate the transition to sustainable, biodiversity-supportive agriculture.

EVENT

01

Third International Conference on Health and Biodiversity (Cohab 3)

September 14-17, 2026 | In-person | Galway City, Ireland |



Organized by the Cohab Initiative Secretariat with a Steering Committee spanning the CBD Secretariat, UNEP, WHO, FAO, UNDP, UNEP-WCMC, OHCHR, and IUCN, Cohab 3 will convene national and local governments, IGOs, NGOs, academia, and Indigenous and community representatives under the theme "*Partnerships for People*

and Planet" to examine the interlinkages between the global health and biodiversity crises, including their nexus with climate, water, food, and nutrition security. Sessions span six themes: Pandemic Prevention, Biodiversity for Food and Nutrition, Oceans and Health, Health Equity for Women and Youth, Disaster Risk Reduction, and Urban Community Health and Well-being. The conference forms part of a 2026-2030 partnership-building process and its outcomes will feed into CBD COP17 in Armenia and UNFCCC COP31 in Turkey later in 2026. The abstract submission deadline has been extended to August 12; registration is open but capacity-limited.

02

4th NIZO Plant Protein Functionality Conference

October 13-16, 2026 | In-person | Papendal, The Netherlands |

Organized by NIZO and Elsevier, this conference brings together academia, research institutes, and industry to advance protein functionality research with a primary focus on plant-based and fermentation-derived proteins, addressing the challenge of feeding almost 10 billion people by 2050 sustainably. Sessions cover protein structure and processing, fermentation to improve ingredient quality, protein analytics, and sustainability across the plant-protein supply chain. Keynote speakers represent institutions in Australia, France (INRAE), the Netherlands, the USA, and Germany. In a nod to its sustainability theme, all conference catering, including the gala dinner, will be fully plant-based. Poster abstracts and registration are open.



4th NIZO Plant Protein Functionality Conference

Papendal, The Netherlands • 13–16 October 2026



03

2027 14th International Conference on Asia Agriculture and Animal (ICAAA 2027)

January 8-10, 2027 | In-person | Fukuoka, Japan |

Now in its 14th edition since first convening in Hong Kong in 2011, ICAAA brings together scholars from across Asia, North America, and beyond to present original theoretical and applied research on farming, crops, irrigation, and animal science. The Call for Papers for ICAAA 2027 covers key topics in



Asian agriculture and animal science, including rice research, crop management, soil health, and pest control. It also addresses animal nutrition, breeding, disease control, sustainable pathways, climate-smart agriculture, biotechnology, AI/IoT integration, and agri-tech innovations. Accepted papers are published in BIO Web of Conferences, indexed by Scopus, DOAJ, and Google Scholar, and may be presented as oral or poster presentations. The submission deadline is August 15, with acceptance notification by September 5 and registration by September 20, 2026.

04

6th Global Food Security Conference

April 19-22, 2027 | In-person | Wageningen University & Research, The Netherlands |

Held under the theme *"Zero Hunger and Resilient Food Systems in an Uncertain World,"* this Elsevier-affiliated conference takes an interdisciplinary, systemic food-systems approach to food and nutrition security, with particular attention to resilience, sustainability, and agency. Six conference themes progress from technological and governance enablers (Harnessing Opportunities, Safeguarding Diversity) through structural interconnections (Balancing Scales, Stabilizing Forces) to actor empowerment (Agency within the Food System, Reflective Science). The conference also welcomes proposals for dialogue sessions bridging science, policy, and practice, and for pre/post-conference workshops on April 19 and 23. The abstract submission deadline is September 11, 2026.

