Making Agrobiodiversity Data Actionable for Food Systems and Biodiversity Goals

Insights for Agrobiodiversity Scientists, Practitioners and Policy Makers

Insights brief

Key Messages

- Agrobiodiversity is a core component of biodiversity that sustains food production, food security, and resilience.
- Despite its importance, it often falls between sectors and decision frameworks.
- The Agrobiodiversity Index Food Planet Prize funded a workshop where around 20 agrobiodiversity researchers and practitioners reviewed characteristics and examples of actionable agrobiodiversity indicators.
- A small set of science-based “node indicators” can make agrobiodiversity data more actionable. The following indicators could be used by, and connect different actors and scales:
  - Effective species number in production
  - Percentage of (semi-)natural habitat in agricultural landscapes
  - Dietary species richness
- Evidence shows that reference points can be defined for these indicators across scales.
- Agrobiodiversity data become actionable when indicators are interpretable, scalable, and linked to decision levels.
- Coordinated collaboration among researchers, practitioners, policymakers, and civil society can reinforce agrobiodiversity data into decision-support and to strengthen its role in food systems transformation.

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Why Agrobiodiversity Data Matter

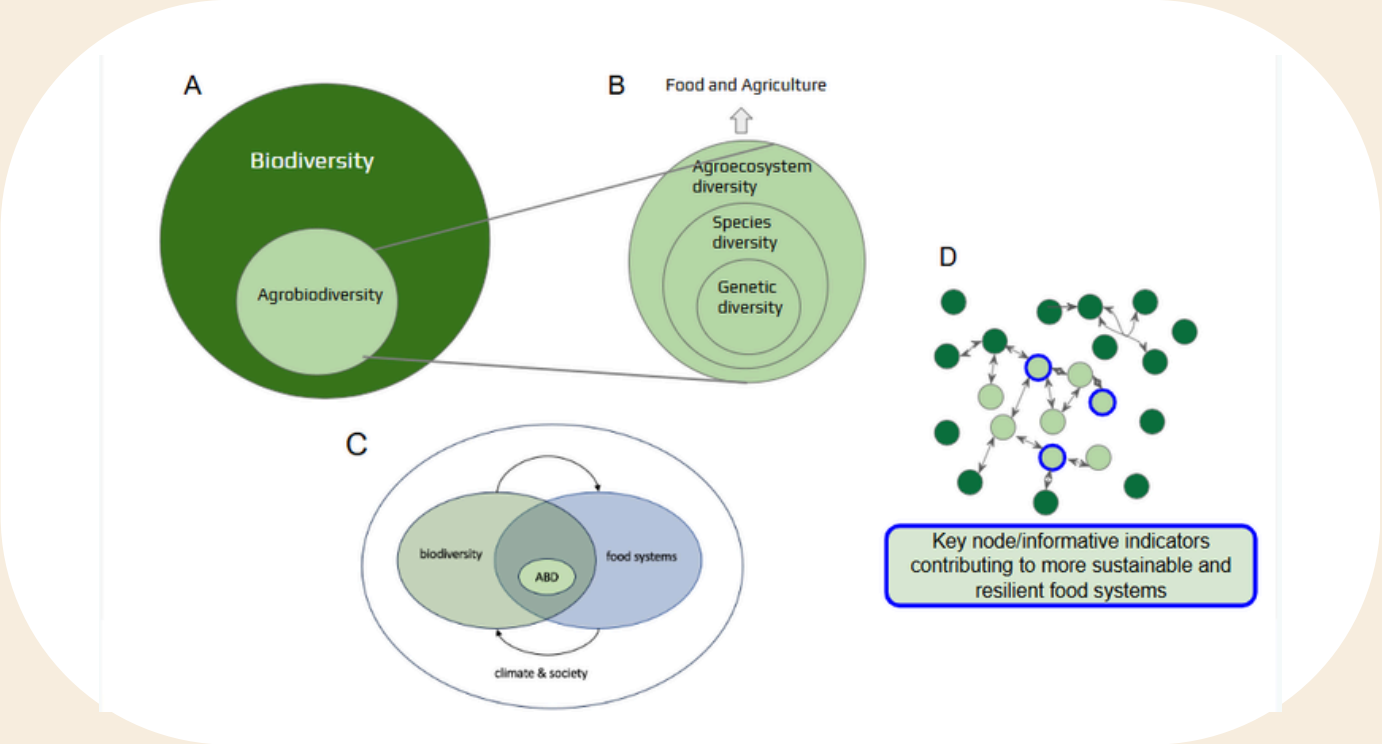


Figure 1. *Agrobiodiversity at the nexus. A) Agrobiodiversity (light green) is part of biodiversity (dark green), B) it spans three levels (genetic diversity, species diversity and ecosystem diversity) and C) it sits at the nexus of biodiversity and food systems sustainability. D) Specific 'node indicators' (circled in purple) of agrobiodiversity, can be critical to measure for food systems sustainability.*

What is Agrobiodiversity?

Agrobiodiversity is defined as the variety of animals, plants, and microbes used for food and agriculture (FAO definition, 1999) encompassing genetic resources (crops, livestock), supporting species (pollinators, soil microbes), and the diversity of the agroecosystems (farms, fisheries, forests) (Figure 1B).

Agrobiodiversity is a core component of biodiversity that sustains food production, food security, and resilience and results from interactions between genetics, environment, human knowledge and management practices (Figure 1A). Through these pathways, it contributes to multiple goals, including environmental (e.g. biodiversity conservation), economic (e.g. agricultural livelihoods) and social goals (e.g. nutrition & health, cultural heritage) (Figure 2)

Why Agrobiodiversity is Difficult To Act On

Agrobiodiversity sits at the nexus of food systems' sustainability and biodiversity (Figure 1C). Hence, it often falls through the cracks of conservation, production, and food system monitoring and decision-making because:

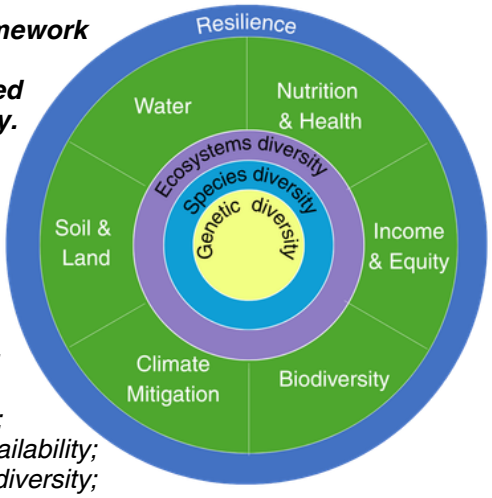
1) It does not fit under 'wild' biodiversity frameworks, yet it is also not fully captured by conventional agricultural statistics;

2) It requires nuance to interpret the data (more is not always better, but neither is less);

3) It spans multiple dimensions (e.g. genetic, species, ecosystems) and contributes to multiple goals (Figure 2). Therefore it does not fit naturally in siloed decision-making structures.

Capturing this multifunctionality is essential, but also raises questions about what should be measured, how, and for what purpose, including analysing the synergies and tradeoffs, the costs and benefits.

Figure 2. ***Draft framework of food systems dimensions affected by agrobiodiversity.***



Agrobiodiversity critically contributes to multiple domains of food systems sustainability, including: nutrition and health; income and equity, soil and land health; water quality and availability; other aspects of biodiversity; climate adaptation and mitigation; and overall food system sustainability and resilience.

Focusing on node indicators

Monitoring all dimensions of agrobiodiversity is neither feasible nor necessary. Building on the Agrobiodiversity Index framework and its applications, priority is placed on identifying node indicators, measurable signs or signals used to monitor the state, level, or change of something that sits at critical nodes for food system sustainability and biodiversity Figure 1D). They should be actionable, meaning:

- Decision-relevant: linked to concrete policy or management levers,
- Understandable and Interpretable, with clear meaning and directionality for specialists and non-specialists,
- Measurable and scalable from farm to national reporting,
- Trusted and governed through transparent methods and documented uncertainty.

What and Whose Decisions Can Agrobiodiversity Data Support

Agrobiodiversity indicators can inform decisions at individual, farm, landscape (subnational), national and global level. Indicators that are relevant at different spatial levels, further serve to connect decisions and strengthen multi-level collaborations. Examples of decisions that agrobiodiversity data can inform are presented in Table 1.

Taken together, agrobiodiversity data play a critical role in identifying food systems vulnerabilities and opportunities for effective nexus actions and investments - that can contribute to multiple domains of sustainability, from farm to national and global scales. Key users of such data include farmers and advisory services, landscape planners, ministries (agriculture, environment, health, finance), procurement actors, and civil society organisations.

Why Action Is Needed Now

While a strong body of evidence demonstrates that agrobiodiversity supports social, economic, and environmental goals at farm, landscape, national, and international levels, limited interpretability and actionability continue to hamper its broader and more systematic use. At the same time, recent developments create a unique opportunity:

- Growing recognition of systems and nexus approaches,
- Expanded scientific evidence and methodological advances,
- New data streams (remote sensing, market and dietary data, citizen science, improved statistics),
- GBF target 10, and inclusion of the Agrobiodiversity Index as a complementary indicator.

Balancing complexity with decision-making now requires clarity on what works, where, and under which conditions.

Table 1. *Decisions that agrobiodiversity data can inform at different spatial levels.*

Farm Level	Landscape Level	National Level
• Selection of crop and livestock species and varieties; • Input requirements and risk-management strategies; • Market access and diversification strategies; • Trade-offs between labour, productivity, stability and resilience from the farmer's perspective.	• Local sourcing strategies and territorial food planning; • Assessment of ecosystem resilience to climate shocks, pests, and diseases.	• Repurposing or prioritization of financial support to the agricultural sector for food system sustainability considering livelihoods, human health, climate and environment; • Creation of more synergies and management of tradeoffs between economic, social and environmental goals; • Reporting and tracking progress under the Global Biodiversity Framework (e.g. Target 10) and Sustainable Development Goals (e.g., SDG 2)

How to Make Agrobiodiversity Data Actionable

Build On Scientific Advances and Multi-Disciplinary Networks

The Agrobiodiversity Index (ABDI) provides a framework and methodology for monitoring agrobiodiversity across conservation, production, and consumption (Jones et al. 2021). Through an array of indicators, it tracks status, commitments, and actions to increase agrobiodiversity's use and conservation, and insights on the risks and opportunities of agrobiodiversity change, to people and nature. Since its development in 2017, new evidence and data have emerged and current efforts aim to include latest advancements to enhance the indicators used to track agrobiodiversity, as well as enhancing their interpretability and actionability.

Furthermore, strengthening actionability requires collaboration across actors, institutions, sectors, models, and scales. Beyond advancing the scientific substance, it is equally important to invest in building connections, mutual understanding, and collaboration across disciplines and communities of practice.

To advance ways to enhance actionability of agrobiodiversity data, the following components are proposed:

1. A shortlist of best-bet indicators;
2. Options for setting reference points across contexts and scales;
3. Recommendations on data pipelines and communication for decision-making.

A) Identifying Best-Bet Indicators

Building on an initial scoping of the literature and collaborative discussions among an Agrobiodiversity Food Planet Prize funded workshop held in Montpellier, France, bringing together around 20 agrobiodiversity experts from different backgrounds, a first set of best-bet indicators emerged. These indicators capture agrobiodiversity's contributions to specific sustainability dimensions of food systems and for which scientific literature has identified quan--tiifiable reference points to help users decide how much and what types of agrobiodiversity is enough to secure these contributions. While the review process is ongoing, initial indicators are illustrated in Table 2.

Cultural biodiversity is recognised as critical for food sovereignty and cultural identity, though further work is needed to determine how best to capture it. Agrobiodiversity is deeply intertwined with cultural diversity and traditional knowledge, each sustaining the other. Its existence and persistence depend on the communities who cultivate it, carrying forward generations of ecological understanding and practice. Conserving agrobiodiversity therefore means more than preserving genetic resources: it actively contributes to maintaining a living cultural identity and ancient, priceless, source of knowledge.

While robust metrics for measuring biocultural dimensions of agrobiodiversity remain underdeveloped, legal recognition of sites that preserve it offers a promising pathway. The designation of agrobiodiversity zones, (i.e. see Peru case), can provide communities engaged in in-situ conservation with formal protection, legitimacy, and institutional support. Strengthening such legal instruments, alongside developing clearer indicators for cultural value and impact, will be essential to honoring the inseparability of this biological and cultural heritage.

B) Setting Reference Points

For agrobiodiversity indicators to be actionable, they must be interpretable relative to reference points. Existing and potential reference points were discussed for three priority indicators:

- **Diets**: A global reference point already embedded in SDG 2 (Zero Hunger) is a minimum of five food groups per day in women's diets for a healthy diet. This could be complemented by a minimum of **ten species per day in diets**, as a potential reference point for nutrient

Table 2. *Best-bet indicators to measure agrobiodiversity's impact on different food systems' dimensions.*

Effective species number in production	Dietary Species Richness	Proportion of (semi-)natural habitat
An intuitive "species count" that accounts for both species richness (number of species) and evenness (relative abundance). Key indicator for yield stability at both farm and national scales, reflecting the ability of a system to maintain stable production, crucial for the system's resilience (Renard and Tilman, 2019; Menesch et al., 2023),	An indicator measuring the number of species consumed in diets, complementing the more conventional diet diversity scores (Hanley-Cook et al. 2025).	Validated and proxy indicator for functional integrity in managed landscapes, reflecting the ecosystem's ability to perform essential ecological functions such as pollination, soil erosion control, and pest control (Mohamed et al. 2024).

adequacy and reduced diet-related disease risk, based on available evidence (Lachat et al. 2018; Hanley-Cook et al. 2021; Hanley-Cook et al. 2025).

- **Production stability**: A minimum of X **effective species number** for lowering risk of losing yield by Y%. This reference point is to be determined still, based on studies at farm and national level of effective species number in production and yield stability (Renard and Tilman, 2019; Menesch et al., 2023).
- **Landscape's functional integrity:** A benchmark of **≥20–25% (semi-)natural habitat** in agricultural landscape for ecosystem functioning, and no reduction through time if higher - to mitigate the risk that agricultural landscapes with 40% of natural habitat reduce it to the minimum threshold of 25% over time. This is an existing reference point (Mohamed et al. 2024).

The emerging indicators listed above can be compared across settings and over time to assess trends and progress. This can shed light on the gap between existing and desirable reference agrobiodiversity levels at farm, landscape, and national levels, similar to what was previously done through the ABDI across 81 countries by Jones et al. (2021).

C) Prioritising Indicators that Can be used to Integrate Agrobiodiversity into Models

Further integration of agrobiodiversity into modelling frameworks used for national and regional decision-making is strongly recommended. Initial integration of agrobiodiversity indicators has already been achieved in models such as IMPACT and the FABLE Calculator, as well as in farm- and landscape-level models. However, several barriers continue to limit broader uptake, particularly in economic modelling frameworks.

One key barrier is the limited comparability of conventional diversity indices through time and across space, and the lack of reference points to facilitate interpretation. Metrics such as Shannon diversity index cannot directly be used to measure the magnitude of differences in agrobiodiversity between two food production systems, and there is no agreement on how much diversity - as measured using the Shannon's Index - is needed to ensure healthy ecosystem functioning or human well-being. In contrast, the priority indicators suggested above are directly interpretable using transparent reference points and are more readily comparable across contexts and through time.

A second challenge relates to the resolution of data. Spatial crop allocation datasets, with which macro-level economic models can disaggregate crop-specific results, can be found at 5-minute resolution, roughly equivalent to 10x10 km2 gridcells (SPAM, GAEZ, MIRCA-OS). This resolution is too coarse for the characterization of changes in agrobiodiversity that influence ecological processes at farm or landscape level.

To address these challenges, current priorities for agrobiodiversity researchers include to co-define, with food system modellers, agrobiodiversity indicators that can be aggregated to country administrative units and that can be computed using data available for at least two model time-steps (e.g. indicators are calculated at 5-year timesteps in the FABLE Calculator).

These advances will enable closer collaboration between agrobiodiversity researchers and economic modeling communities to better leverage agrobiodiversity indicators, data, and interventions in food system scenario analyses and the identification of sustainable food and land use system pathways.

Call to Action

As a group of international agrobiodiversity scientists and practitioners, we call for three actions:

- **Collaborate** to address data and knowledge gaps on agrobiodiversity, bringing together science, practice and policy insights across sectors.
- **Integrate and mainstream** the existing agrobiodiversity indicators, data and insights into decision-making at farm, landscape, and national levels.
- **Communicate** the multifunctional role of agrobiodiversity in food systems and societies, engaging a diverse range of actors.

Join us in advancing these priorities.

Purpose, Methodology and Context

This insights brief is based on a three-day participatory workshop held in Montpellier (17–19 November 2025), co-organised by the Alliance of Bioversity International-CIAT) and glocolearning, funded by the Agrobiodiversity Index Food Planet Prize.

Around twenty experts and practitioners from the Alliance of Bioversity International-CIAT, Cirad, CNRS, glocolearning, IRD, and collaborators, engaged through visioning exercises, world cafés, indicator ranking, framework refinement, and collaborative synthesis to identify pathways for making agrobiodiversity data more interpretable and actionable across scales.

This work contributes to a broader process aimed at

- Sharpening the Agrobiodiversity Index (ABDI), including its application for GBF Target 10;
- Strengthening communication and engagement around agrobiodiversity data;
- Building a stronger global community on agrobiodiversity science for people and nature.

The brief focuses on species- and ecosystem-level agrobiodiversity indicators that can be operationalised across production systems, landscapes, and diets. Genetic diversity indicators are critical but were not included in the scope of this workshop.

This brief is part of a larger communication strategy with an upcoming perspective paper, followed by a photo competition and serious game.

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