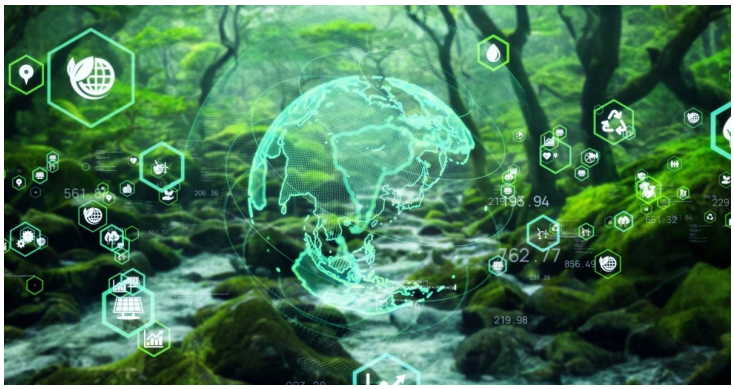
AgroSpectrum ASIA
Envisaging Future | Updating Present

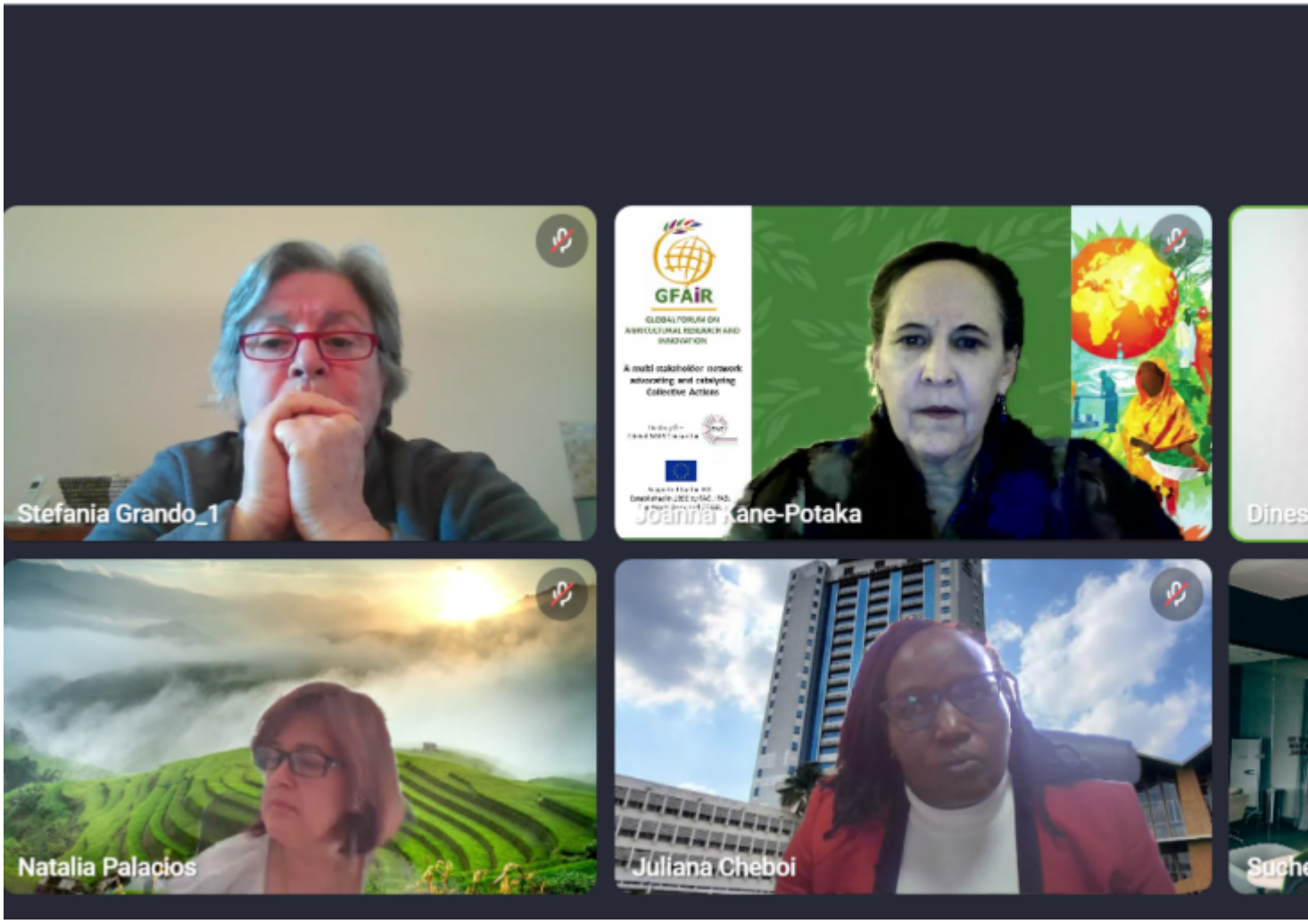
Building climate resilience from seed to shelf: Why agrobiodiversity is becoming strategic imperative

05 January 2026 | News

Insights from the AgroSpectrumâ??GFAiR dialogue reveal how dryland crops, participatory breeding, and value-chain integration can transform biodiversity from a conservation ideal into a scalable strategy for climate-resilient, nutrition-secure food systems



Insights from the AgroSpectrumâ??GFAiR dialogue reveal how dryland crops, participatory breeding, and value-chain integration can transform biodiversity from a conservation ideal into a scalable strategy for climate-resilient, nutrition-secure food systems



At a time when climate volatility, water stress, nutritional insecurity, and biodiversity loss are converging into a systemic food crisis, agrobiodiversity is no longer a peripheral concernâ??it is rapidly becoming a strategic imperative. This was the central message that emerged from *â??Mainstreaming Agrobiodiversity in Global Value Chains,â?•* an AgroSpectrum webinar organised in partnership with GFAiR â?? The Global Forum on Agricultural Research and Innovation, bringing together leading voices from international research, plant breeding, policy, and state-level implementation.

The webinar moved deliberately beyond conservation rhetoric to examine how biodiversity can be operationalised across seed systems, breeding pipelines, food processing, and markets. By anchoring global scientific insights alongside grounded implementation experiences, the discussion reframed agrobiodiversity not as a nostalgic return to the past, but as a forward-looking economic and resilience strategy for climate-constrained food systems.

Dryland Crops: Not Underutilised, but Underinvested

Setting the global analytical frame, Dr Stefania Grando, International Consultant, Agronomist and Plant Breeder, challenged one of the most persistent assumptions in agricultural developmentâ??that millets, sorghum, barley, and dryland legumes are marginal crops with limited relevance to modern food systems. Drawing on more than three decades of work across CGIAR systems, she argued that this narrative fundamentally misdiagnoses the problem. The constraint facing dryland crops, she emphasised, is not agronomy or farmer reluctance, but scientific prioritisationâ??and the investment architecture that flows from it.

â??Climate change is not a single stress but a moving constellation of uncertainties. While rising temperatures and declining rainfall are globally visible, their local expression is impossible to predict. Breeding, therefore, must target variability itself, not a fixed outcome. Uniform, input-intensive varieties are ill-suited to this reality. Dryland crops, shaped by centuries of stress and uncertainty, already embody the resilience modern breeding systems urgently needâ??but continue to be systematically underinvested.â?

--- Dr Stefania Grando, International Consultant, Agronomist and Plant Breeder

At a moment when climate change has transformed agriculture into a moving target rather than a predictable system, Dr Stefania Grando noted that breeding for uniformity has become a structural weakness. The global food system remains anchored to a narrow triumvirateâ??rice, wheat, and maizeâ??optimised for an era of climatic stability and cheap inputs. In contrast, dryland crops evolved under stress, variability, and low external inputs. Yet they receive only a fraction of global research funding and breeding attention.

The consequences of this concentration are systemic: accelerated genetic erosion, hollowed-out value chains, rising dependence on water and fertilisers, and the displacement of nutrient-dense traditional diets by calorie-heavy alternatives. In many arid and semi-arid regions, dryland crops now represent the last viable defence against land degradation and desertification. Still, their strategic importance remains largely invisible in mainstream policy and investment decisions.

At the centre of this neglect lies a missing linkâ??seed systems. Without functional pathways connecting gene banks, breeders, farmers, processors, and markets, biodiversity remains frozen in collections rather than alive and adaptive in farmersâ?? fields. Restoring diversity, Dr Stefania Grando argued, requires a decisive shift from conservation to useâ??building networks of adaptation that make biodiversity economically viable rather than morally symbolic.

From Legacy to Leverage: Odishaâ??s Biodiversity Playbook

If Dr Stefania Grando articulated the global diagnosis, Odisha offered a rare example of treatment at scale. Representing the Department of Agriculture and Farmersâ?? Empowerment, Government of Odisha, Dinesh Balam outlined how the state has deliberately reframed agrobiodiversity from a legacy issue to be preserved into a forward-looking economic and climate resilience strategy.

Rather than importing varietal solutions designed elsewhere, Odisha began by taking stock of its own agroecological wealth. Across intervention blocks, the state assembled the full spectrum of available millet diversityâ??farmer-conserved landraces alongside formally released varietiesâ??and subjected them to participatory varietal trials under real farm conditions. Farmers acted not as technology recipients but as primary evaluators, assessing crops on yield, taste, lodging resistance, pest tolerance, and performance under Odishaâ??s increasingly erratic rainfall patterns.

â??Odisha built an institutional bridge between conservation and commerce by redesigning seed systems around farmers. Through â??crop diversity blocks,â?? landraces are evaluated side by side under real farm

conditions, selected by farmers, and then purified, multiplied, and scaled through FPO-led seed production. By treating in-situ conservation as a public good and rewarding farmers for it, biodiversity becomes not a legacy to preserve, but a productive, income-generating asset embedded in the stateâ??s agricultural strategy.â?

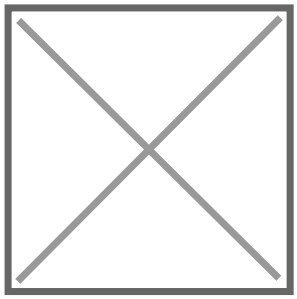
--- Dinesh Balam, Representing the Department of Agriculture and Farmersâ?? Empowerment, Government of Odisha

The outcomes were instructive. In over 80 per cent of cases, farmers preferred local landraces to formally released varieties. Subsequent scientific assessments validated these preferences, revealing that at least 14 traditional varieties outperformed university-bred lines on both yield and resilience traits within local micro-agroclimatic conditions. The bottleneck, as Balam noted, was not performance but institutional recognition.

To address this, Odisha built a dedicated seed system for landracesâ??anchored in crop diversity blocks, scientific purification protocols, and decentralised seed production led by farmer producer organisations (FPOs), with technical backstopping from public research institutions. Conservation was treated as a public good, and farmers were rewarded as custodians and innovators. What began with millets is now expanding to pulses, oilseeds, and vegetables through a formal state scheme on neglected crops and forgotten foods, signalling a shift from pilot interventions to systemic policy adoption.

Africaâ??s Perspective: Diversity Exists, Scaling Does Not

Bringing a grounded African perspective to the discussion, Dr Juliana Jepkemoi Cheboi, Vice Chairperson, Plant Breeding Association of Kenya (PBAK), argued that the continentâ??s central challenge has never been a lack of genetic diversity, but the failure to scale innovation without marginalising smallholders.



â??Africaâ??s challenge is not a lack of biodiversity but the failure of seed systems to scale it inclusively. In arid regions like Kenya, maize-centric policies have created a mismatch between crops and climate. Landraces and wild relatives of sorghum, millets, and indigenous vegetables already offer heat tolerance, low water demand, and superior nutrition. Reintegrating them into breeding systemsâ??through participatory selection and community seed banksâ??can turn biodiversity from rhetoric into climate-resilient livelihoods.â?Â

-- Dr Juliana Jepkemoi Cheboi, Vice Chairperson, Plant Breeding Association of Kenya (PBAK)

In countries such as Kenyaâ??where more than 80 per cent of land lies in arid and semi-arid zonesâ??the dominance of maize-centric research and policy has created a structural mismatch between crops and climate. Dr Juliana Cheboi highlighted how landraces and wild relatives of sorghum, finger millet, and indigenous vegetables such as amaranth and spider plant already carry the traits required for heat tolerance, low water use, and nutrient density. Yet they remain largely excluded from formal breeding pipelines.

Reintegrating these crops, she stressed, requires participatory varietal selection, stronger links between formal seed systems and community gene banks, and deliberate inclusion of women and youth across value chains. Only by aligning farmer demand, breeding priorities, and policy incentives can biodiversity transition from conservation rhetoric to an engine of inclusive, climate-resilient food systems.

Rethinking Staples: Biodiversity From Within

Challenging the perceived trade-off between staples and diversity, Dr Natalia Palacios Rojas, Principal Scientist, International Maize and Wheat Improvement Center (CIMMYT), reframed the role of maize and wheat in future food systems. As global agriculture confronts the simultaneous transgression of planetary and health boundaries, she argued that staples must deliver nutrition, sustainability, and economic viabilityâ??without sacrificing yield or farmer adoption.

â?? Nutrition cannot be delivered by genetics alone. At CIMMYT, we are reconnecting breeding with farming systems and food cultureâ??learning from models like the milpa, where maize, legumes, and vegetables are grown together to build productivity, soil health, and resilience. Processing innovations such as whole-kernel use, fermentation, nixtamalization, and blended flours allow staples to carry greater nutritional diversity, showing that yield, health, and market acceptance can reinforceâ??not compete with each other. â?

--- Dr Natalia Palacios Rojas, Principal Scientist, International Maize and Wheat Improvement Center (CIMMYT)

At CIMMYT, this has translated into embedding nutritional biodiversity directly into maize and wheat through biofortification for zinc, provitamin A, protein quality, and fibre. Participatory breeding now ensures that nutrition-enhanced varieties reflect farmer and consumer preferences, guiding target product profiles that respond to real-world demand rather than laboratory assumptions.

Dr Rojas also emphasised that breeding alone is insufficient. By drawing on traditional farming systems such as Latin Americaâ??s milpa, and rethinking food processing through whole-grain use, fermentation, nixtamalization, and blended flours combining staples with sorghum, millets, legumes, and indigenous crops, CIMMYT is reconnecting genetics, diets, and cultureâ??while reducing food loss and waste.

From Silos to Systems: The Global Policy Lens

Placing these field-level experiences within the wider architecture of global research and governance, Joanna Kane-Potaka, Executive Secretary, GFAiR â?? The Global Forum on Agricultural Research and Innovation, argued that agrobiodiversity remains structurally disadvantaged by fragmented policy frameworks. While biodiversity features prominently in national strategies, most governments continue to operate through siloed mandatesâ??separating nutrition, environment, and commodity support.

â??Biodiversity will not scale through isolated interventions. It requires whole-of-value-chain alignmentâ??linking seed systems, markets, processing, certification, and consumer demand. Dryland and underutilised crops already deliver a triple dividend for nutrition, the environment, and farmer livelihoods, yet remain locked out by weak incentives. Rebuilding demand from seed to plate, through smarter staples and true co-partnerships, is essentialâ??where farmers are not beneficiaries of innovation, but its co-architects.â?

--- Joanna Kane-Potaka, Executive Secretary, GFAiR â?? The Global Forum on Agricultural Research and Innovation

For biodiversity-led innovation to scale, Joanna stressed the need for whole-of-value-chain alignmentâ??integrating seed systems, markets, processing, certification, and consumer demand. Dryland crops and underutilised species already embody a triple dividend of nutrition, environmental sustainability, and farmer livelihoods, yet remain excluded due to weak incentives and eroded market infrastructure.

Reversing this trajectory, she concluded, requires â??smarter staples,â? rebuilt demand from seed to plate, and a shift from partnerships to co-partnershipsâ??where farmers are not beneficiaries of innovation, but co-architects of it.

From Narrative to Strategy

The AgroSpectrumâ??GFAiR webinar underscored a central truth: Agrobiodiversity does not fail because farmers reject it. It fails when institutions lack the mechanisms to recognise, validate, and reward it. Across geographiesâ??from Odisha to East Africa to global breeding programmesâ??the science exists, farmer willingness exists, and the climate imperative is unmistakable.

What remains is a strategic choice. In a climate-constrained world, resilience will not emerge from uniformity. It will come from diversityâ??scientifically supported, economically rewarded, and mainstreamed into global value chains.

--- Suchetana Choudhury (suchetana.choudhuri@agrospectrumindia.com)