SEEDS OF CHANGE, PART 2 –

BREEDING, FOOTPRINTS AND FUTURE PATHWAYS

INSIDE THE SUSTAINABILITY TOOLBOX – HOW LEADING SEED COMPANIES ARE BREEDING, OPERATING, AND INNOVATING TO MEET GLOBAL CLIMATE GOALS. BY: MARCEL BRUINS

When you ask a plant breeder what "sustainability" looks like, the answer increasingly comes down to traits. Traits for tougher weather, for thriftier water use, for sturdier plants that need fewer chemical crutches. Yet sustainability doesn't stop in the field. It also depends on how seed companies run their own operations — from research sites to supply chains — and how they translate innovation into measurable impact for farmers and the planet.

TURNING COLLABORATION INTO ACTION

What makes these efforts particularly powerful is that they're not happening in isolation. Through the ISF Environmental and Social Responsibility Coordination Group (ESR-CG), leading seed companies are aligning on shared priorities, pooling knowledge, and presenting a unified voice on horizontal sustainability topics. This association-driven collaboration reflects a collective spirit: being stronger together, amplifying impact, and ensuring that sustainability becomes embedded across the sector, from breeding strategies to business practices.

In the second part of our Seeds of Change series, *Seed World Europe* spoke with five leaders — Cristiane Lourenço, director, global sustainability & smallholder farmers at Bayer; Eduard Fitó, president of Semillas Fitó; José Ré, sustainable ag science advisor for RiceTec; and Jason Allerding, global head, HSE, sustainability & risk management seeds for Syngenta — to explore how these companies are using science, technology, and company culture to make agriculture both more productive and more responsible.

BREEDING FOR A CHANGING PLANET

At Bayer, breeding for sustainability means attacking complexity on multiple fronts. "It takes a broad range of traits to tackle the challenges facing farmers," says Lourenço. "Yield potential, climate resilience, pest resistance, and nutritional value — while reducing fertilizer and input needs — all of it matters."

New technologies are multiplying the breeder's reach. Biotechnology, genome editing, and digital prediction tools now allow Bayer's teams to select more precisely and faster than ever before. "The goal," Lourenço explains, "is to produce more while restoring more." That means crops that better resist drought and disease, hybrids that use nitrogen more efficiently, and varieties that protect soil through shorter growth cycles or deeper rooting.

At RiceTec, the sustainability mindset is not new. "It's embedded in our history," says Ré. "From the start, we were breeding hybrids that could thrive in direct-seeded systems — that was sustainability before the word became mainstream."

Ré adds that those early decisions shaped the company's trajectory. "We built disease tolerance, strong roots, and seed vigour into our hybrids long before climate resilience became a buzzword." Today, those traits are proving essential to help farmers transition toward Direct Seeded Rice (DSR) — a system that reduces water use, methane emissions, and labour.

Scientific validation has followed. Studies from UC Davis, the University of Arkansas, and the USDA show that RiceTec hybrids emit less methane under both traditional and water-saving regimes, and when expressed as yield-scaled global-warming potential, the advantage grows even larger. "We've been delivering water-use efficiency and climate resilience for more than two decades," Ré says. "The next step is accelerating genetic gain with tools like genomic selection and gene editing."

RiceTec's new genomic platform pinpoints DNA regions linked to yield stability under heat and drought. "We're identifying and combining the regions that keep yields steady when temperatures spike or irrigation water runs low," Ré explains. "That's where sustainability meets profitability."

For Fitó at Semillas Fitó, the breeding toolbox looks a little different but serves the same goal: lowering inputs and improving efficiency. "We're not yet targeting nitrogen-use efficiency in cereals," he says, "but in vegetables we are focusing on labour-saving and worker-friendly traits — plants that are easier to prune, fewer thorns, smoother surfaces. That's sustainability for people."

His vegetable programmes also reach into nutrition. "We're selecting 'superfood' varieties with higher antioxidant content and better health value," he says. "Sustainability is not only about convenience or taste; it's about human well-being."

SUSTAINABILITY STARTS AT HOME

Farmers are not the only ones under pressure to shrink their footprints; seed companies themselves are re-engineering how they operate.

At RiceTec, a quiet revolution is underway in seed production. In India, the company is shifting hybrid seed multiplication from traditional transplanting to Direct Seeded Rice (DSR). "It's one of our most impactful initiatives," Ré says. "Moving to DSR in seed production alone can drastically cut water use, greenhouse-gas emissions, and labour demands."

But DSR is technically demanding. "Each parent line responds differently to the new system," Ré explains. "Synchronizing flowering for pollination is critical, so we've had to adjust breeding lines and agronomic management simultaneously." The result will be a seed-production model that mirrors the sustainability gains RiceTec promotes for farmers.

Across its global footprint, RiceTec invests in breeding platforms, seed treatments, and agronomic systems that reduce resource inputs while maintaining yield. "From methane-reducing hybrids to water-efficient growing systems, sustainability is embedded in every stage of our value chain," Ré says.

At Bayer, sustainability has become an enterprise-wide discipline rather than a side project. "We are committed to building an efficient and sustainable end-to-end supply chain," Lourenço explains. The company's targets are as detailed as its breeding plans:

- Climate neutrality across all sites by 2030.
- 42% reduction in greenhouse-gas emissions (from 2019 levels) by 2029.
- 100% renewable electricity worldwide.
- 12.3% cut in supply chain emissions by 2029, and net zero across the full value chain by 2050.

Water management is another pillar. "Fresh water is critical for seed production," Lourenço notes. "We're partnering with growers in water-scarce areas to identify risks and improve efficiency." By 2030, Bayer plans to have water-management systems in all relevant sites and to strengthen local watershed stewardship wherever it operates.

Fitó approaches internal sustainability from the ground up — literally. "We encourage our employees to bring ideas," he says. "If someone suggests a way to save water or recycle waste, we test it. When it works, we share it across the company." Fitó's favourite example came from the seed-extraction unit. "We use a lot of water to wash seeds out of fruit. One of our employees proposed recycling it through wells and filtration. Now we reuse the same water, and the savings are significant — especially in our Mediterranean climate."

Semillas Fitó also installs solar panels wherever feasible and offers electric-vehicle options to staff. "Not everyone can use them yet — some sales reps drive long distances — but the choice is there," Fitó says. "Sustainability has to be both top-down and bottom-up."

Syngenta is embedding sustainability into its product pipeline through a Portfolio Sustainability Framework (PSF), launched in 2024 with the crop protection portfolio and expanded in 2025 with seeds. "It's a data-driven tool that evaluates seed varieties on environmental impact, input efficiency, and climate resilience," explains Allerding. The framework guides breeding decisions toward varieties that support regenerative agriculture, reduce carbon emissions, and improve resource use.

"Every product entering development is now screened through the PSF criteria," Allerding says. "That means sustainability metrics are connecting to research priorities in real time." The system also allows the company to quantify progress and share transparent results with regulators and customers alike.

PROJECTS THAT INSPIRE

Beyond corporate metrics, tangible stories often make the biggest impression — examples that others can adapt and scale. Each of these companies can point to initiatives that embody the new sustainability mindset.

For RiceTec, the standout is FullPage®, launched commercially in India in 2024 as the country's first herbicide-tolerant crop. Designed specifically for direct-seeding, FullPage enables efficient weed control without the water and methane intensity of transplanting. "It's a catalyst for change," Ré says. "Farmers adopting FullPage are reducing water use, greenhouse-gas emissions, and labour costs — and seeing more reliable yields."

The company's commitment extends beyond Asia. In the U.S., RiceTec is a charter member of the Rice Stewardship

The new sustainability toolbox combines precision genetics, operational accountability, and cultural engagement. Photo: Ricetec

Plant breeding turns climate goals into real-world impact, translating genetic gains into stronger yields, lower footprints, and more resilient farming systems. Photo: Ricetec

Partnership, a collaboration of growers, conservation groups, and the USDA. The programme promotes nutrient and irrigation management, aquifer protection, and wildlife habitat across the Mid-South and Gulf Coast. "It's about efficiency and biodiversity together," Ré says. "When we protect the environment, we protect the farmer's bottom line."

Bayer's flagship example also comes from rice: its DirectAcres programme, which empowers smallholder farmers to adopt sustainable practices. Through partnerships with the Indian Council of Agricultural Research and the Government of India network of research stations, Bayer is helping drive transformation in this critical food crop. DirectAcres helps farmers as they transition from transplanted puddled rice to direct-seeded rice, offering growers agronomic training and providing digital support — complete with chatbot guidance from the FarmRise app.

"Our high-yielding Arize hybrids that can be direct seeded give farmers strong, stable yields while cutting water use and methane emissions," Lourenço explains. "It's not only a climate initiative; it's a livelihoods initiative." Bayer is also pioneering carbon-credit schemes in India that reward farmers for verified regenerative practices — a first of its kind in the region.

At Semillas Fitó, the proudest achievement may not involve high technology at all but human ingenuity. "The water-recycling idea came from the shop floor, not from management," Fitó says. "That makes it special." His team's internal newsletter celebrates every employee-led improvement, from simple recycling hacks to procedural changes that save electricity or reduce waste. "People see that their ideas matter," he adds. "That culture is what keeps the momentum."

For Syngenta, the Portfolio Sustainability Framework itself is both innovation and inspiration. "It's changing how we measure success," Allerding says. "To score highly in this framework, a variety can't just yield well; it has to score well on resource efficiency and climate resilience. That alignment between product performance and environmental performance is influencing the future of breeding."

PURPOSE AND THE HUMAN FACTOR

When asked what drives him personally, Fitó pauses. "I wasn't the one who first brought sustainability to our company," he admits, "but it's now part of who we are — part of me." For Fitó, sustainability is inseparable from purpose. "A company must have a purpose beyond profit. Every decision we make impacts society, and we have a responsibility for those impacts."

He sees sustainability as the expression of that responsibility: "The more you learn, the more you realise that you're not running the show alone. Sustainability gives meaning to what we do — it's the framework that connects our business with society."

That sentiment resonates across the industry. Whether expressed through Bayer's decarbonisation charts, RiceTec's hybrid pipelines, Syngenta's metrics dashboards, or Fitó's bottom-up initiatives, sustainability has moved from project to purpose. It is no longer the frosting on the cake; it is the recipe itself.

FROM TRAITS TO TRANSFORMATION

Looking across these companies, a clear pattern emerges. The new sustainability toolbox combines precision genetics, operational accountability, and cultural engagement. Breeders are selecting for deeper roots and stronger stems, but also for deeper values and stronger commitments.

Bayer's renewable-energy and water-management targets show that large corporations can anchor climate action in measurable goals. RiceTec demonstrates how a medium-sized, crop-specific firm can transform an entire production system through consistent trait development and farmer training. Syngenta's data-driven framework integrates sustainability into every research decision, ensuring innovation and responsibility advance together. Semillas Fitó proves that small ideas, multiplied across teams, can yield large results.

Through their collaboration in ISF's ESR-CG, these companies are ensuring that such efforts resonate beyond their own fields and facilities, helping shape a more unified and impactful sustainability agenda for the seed sector.

Together, these stories mark a shift from isolated projects to systemic change. As Fitó puts it, "Sustainability isn't a department. It's an attitude." ▲

To read Part 1, scan the QR code.