



Global Juice Sustainability Report 2026



CONTENTS

04	Foreword from the President
05	IFU SWG Chair's Foreword
07	Artificial Intelligence and Sustainability: The Real Challenge Is Not the Technology
09	Sustainability Practices in Zimbabwe: Progress, Challenges and Future Prospects
11	Empowering Women through Sustainable Juice Production in Nigeria
15	Nature as Infrastructure: A New Business Model for Resilient Industry
19	Our Net Zero Journey: Transforming the Citrus Industry Toward a Sustainable Future
22	Advancing Regenerative Citrus Farming in Brazil
25	Working with Ecuatorian Farmers to Build Healthier Soils
26	Sharing Knowledge to Strengthen Passion Fruit Production in Northern Peru
27	Cranberry Pomace Bioactive Content and Valorization Opportunities
29	Touching Lives Through Sustainable and Responsible Business
30	From Belém to Antalya: Bringing the Hidden Middle of Food Value Chains into FocusSmart refrigeration for a more sustainable juice production

32	Giving New Value to Passion Fruit By-Products
33	AIJN sustainability strategy: from common vision to collective action
35	Advancing Sustainable Innovation in Mediterranean Food Value Chains
39	People make the difference: The case for sustainable leadership in the juice industry
41	PPWR – An overview of the European Union’s Packaging and Packaging Waste Regulation and their implications for the juice industry
45	From Farm to Factory: Practical Sustainability in Australia’s Juice Industry
48	From Orchard to Glass: IFU at COP30
51	Partnering for Sustainable Food Systems: How the Global Flagship Initiative for Food Security Advances the Sustainable Development Goals
54	CITRUSBUSTERS: transforming citrus by-products into natural plant protection solutions
56	Sustainable Juice Platform: Turning Collaboration into Action
58	Businesses face new environmental management expectations as ISO 14001 receives a major update
60	ISO 20001: A New Global Standard for Tackling Food Loss and Waste
62	The Sustainable Juice Covenant: Turning collective ambition into measurable progress



Foreword from the President

Kees Cools, IFU President

Navigating Transformation: Building Resilience for the Future

This year's report demonstrates the remarkable diversity, expertise and commitment that exist throughout our industry. From regenerative agriculture in Brazil to food waste solutions in North America, from community development initiatives in Africa to emerging technologies in Europe and Asia, they collectively illustrate an industry that is actively adapting to a rapidly changing world. The challenge before us is clear. Climate change is no longer a future scenario; it is a present reality affecting agricultural production across every continent. Extreme weather events, prolonged droughts, changing rainfall patterns, water scarcity, soil degradation and the spread of pests and diseases are increasingly influencing the

availability, quality and cost of fruit and vegetable raw materials. For many growers, the question is no longer whether climate change will affect their operations, but how quickly they can adapt.

The long-term resilience of our industry depends on our ability to innovate. Advances in crop science are helping farmers develop more resilient production systems through improved varieties, regenerative practices, precision agriculture and better water management. At the same time, innovation in processing technologies is enabling manufacturers to use resources more efficiently, reduce energy consumption, improve yields and unlock

new value from by-products that were previously overlooked. Science and innovation will be among our most important tools for securing a sustainable supply of nutritious foods and beverages for future generations.

Another transformative force is the rapid emergence of artificial intelligence. While AI is often discussed in terms of efficiency and automation, its potential impact on food systems is far broader. Across the supply chain, AI is beginning to improve crop forecasting, optimize logistics, enhance quality management, support predictive maintenance and strengthen traceability. It is also helping businesses better understand changing consumer preferences and demand patterns. As these technologies mature, they will provide opportunities to reduce waste, improve resource utilization and support more informed decision-making at every stage from orchard to consumer.

At the same time, technological progress must be accompanied by responsible leadership. Digital solutions and AI can provide valuable insights, but they cannot replace the expertise, judgement and commitment of growers, processors, researchers and industry leaders. The most successful organizations will be those that combine technological innovation with strong sustainability values and a clear understanding of their social and environmental responsibilities.

Food loss and waste remain among the greatest challenges facing the global food system. Significant quantities of valuable agricultural production are still lost before reaching consumers, while edible food continues to be wasted throughout supply chains and households. For our sector, reducing waste is both an environmental necessity and a business opportunity. Improved harvesting techniques, better storage and transportation systems, more efficient processing technologies and

the continued development of circular economy solutions can help maximize the value of every fruit and vegetable produced. The growing use of side streams for ingredients, animal feed, bio-based materials, renewable energy and other innovative applications demonstrates how waste can increasingly become a resource.

These challenges and opportunities reinforce an important truth: sustainability is not a destination but a continuous process of adaptation and improvement. The future will demand greater resilience, stronger collaboration and a willingness to embrace new ideas. It will require us to balance economic competitiveness with environmental stewardship, while continuing to provide safe, nutritious and accessible products to consumers around the world.

“The juice industry has a long history of innovation, partnership and problem-solving.”

The juice industry has a long history of innovation, partnership and problem-solving. The examples presented in this report show that our sector is not standing still. Across regions and across the value chain, companies, farmers, researchers and industry organizations are developing practical solutions that contribute to a more sustainable and resilient future.

I would like to express my sincere appreciation to all contributors, as well as to the IFU Sustainability Working Group, that will soon be changed into a commission, whose dedication and expertise have made this publication possible. I hope this report provides valuable insights, inspires further action and strengthens our shared commitment to building a sustainable future for the global fruit and vegetable juice industry.



Chairs Opening – IFU Sustainability Report 2026



Shannon Doherty-Andall,
IFU Sustainability Working Group Chair

As we publish the 2026 IFU Global Juice Sustainability Report, the fruit and vegetable juice industry continues to operate within a sustainability landscape that is becoming more complex, more regulated and, importantly, more focused on implementation.

Progress has not always followed a straight line. Negotiations toward a global treaty on plastic pollution faltered last year, and the first half of 2026 was largely focused on rebuilding the pathway forward. Recent meetings between Heads of Delegation and renewed engagement with observers suggest that momentum is returning. While significant differences remain, the process continues to demonstrate the importance of international cooperation and of developing solutions that can be implemented across countries with very different resources, infrastructure and supply-chain realities.

In Europe, the Packaging and Packaging Waste Regulation has moved forward at a very different pace. With its general application commencing in August 2026, the PPWR is shifting attention from policy design to preparation, compliance and delivery. Its influence will extend well beyond Europe, affecting available packaging specifications, supply chains, data requirements, investment decisions and the availability of materials and technologies across global markets.

Against this backdrop, the contributions to this year's report demonstrate that sustainability is not simply a regulatory exercise. It is being advanced throughout the juice value chain, from regenerative citrus farming and collaboration with smallholders to science-based climate

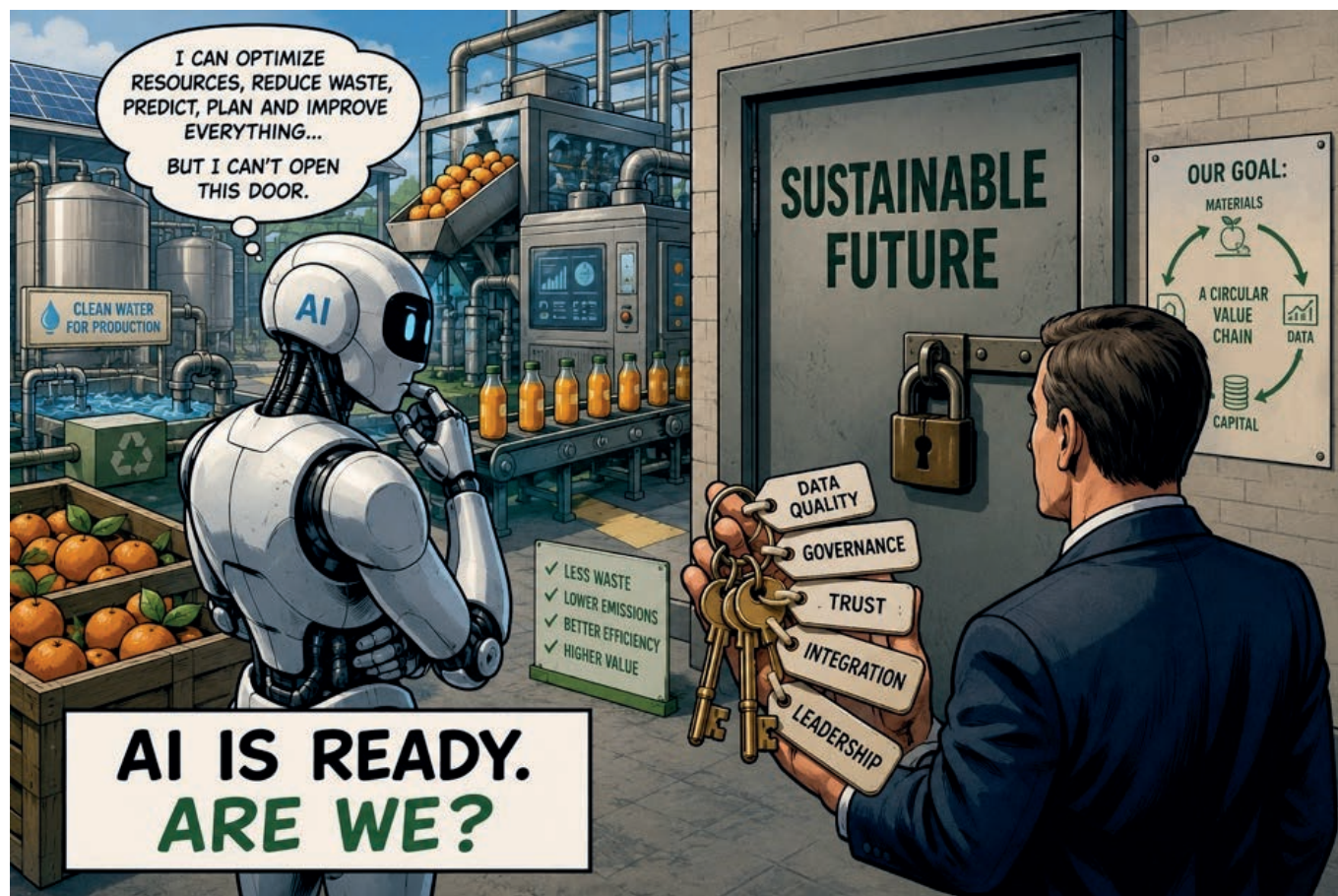
targets, sustainable leadership and new approaches to using valuable by-products. The report also explores regional challenges, collective initiatives such as the Sustainable Juice Covenant, emerging projects and the international discussions surrounding COP31.

“What connects these diverse contributions is a focus on translating ambition into action.”

What connects these diverse contributions is a focus on translating ambition into action. The circumstances facing a citrus grower in Brazil, a juice producer in Zimbabwe, a cranberry processor in the Americas, or a European packaging supplier may be very different. However, each forms part of an interconnected industry that depends upon resilient agricultural systems, responsible resource use, effective partnerships and the ability to adapt.

The IFU Sustainability Working Group provides an important forum through which this knowledge can be shared. By learning from different regions and parts of the value chain, we can identify solutions that are credible, practical and adaptable rather than assuming that one approach will suit every market.

I would like to thank each contributor to this year's report, as well as the members of the Working Group who continue to share their expertise so generously. I hope these articles provide both useful insights and encouragement as industry continues the work of building a resilient and sustainable future.



Artificial Intelligence and Sustainability: The Real Challenge Is Not the Technology

Slim Othmani, IFU Africa Ambassador

For more than two decades, the juice and beverage industry has pursued sustainability through better resource management: reducing water consumption, improving energy efficiency, minimizing waste, optimizing logistics, and increasing packaging recyclability. Today, Artificial Intelligence (AI) is often presented as the next major accelerator of this journey. The promises are compelling. AI can improve demand forecasting, optimize production planning, reduce product losses, predict equipment failures, improve inventory management,

and identify new ways to valorize by-products. In theory, it can simultaneously optimize the flow of materials, the flow of information, and the flow of capital across the entire value chain.

Yet despite these opportunities, AI adoption remains slower and more fragmented than many expected.

The question therefore is no longer what AI can do. Most business leaders are already aware of its potential. The

more interesting question is why a technology capable of generating both economic and environmental benefits is not spreading more rapidly throughout our industry.

The answer lies in a lesson that industrial history has taught us repeatedly. Technologies do not transform organizations simply because they exist. Electricity, despite its obvious advantages, took decades to reshape factories. The internet followed a similar path. In both cases, the limiting factor was not the technology itself but the ability of organizations to adapt their structures, processes, skills, and culture to fully benefit from it.

AI is likely following the same trajectory.

The first obstacle is data. Artificial Intelligence depends on large volumes of reliable and accessible information. Yet many companies still operate with fragmented systems, isolated databases, spreadsheets, and disconnected processes. AI does not solve poor data quality; it amplifies it. Before becoming an AI-enabled organization, a company must first become a data-enabled organization.

The second challenge is organizational. Sustainability, operations, procurement, finance, logistics, and commercial functions often operate within separate structures, each with its own objectives and performance indicators. AI, however, delivers its greatest value when it can connect these domains and optimize them simultaneously. This requires a level of integration that many organizations have not yet achieved.

The third challenge concerns trust and governance. Business leaders are increasingly confronted with questions surrounding data sovereignty, cybersecurity, intellectual property, and regulatory compliance. In many jurisdictions, the legal and ethical frameworks governing AI remain under construction. Companies are understandably cautious about entrusting critical decisions to systems whose responsibilities and liabilities are not yet fully defined.

“There is also a human dimension that is frequently underestimated. Every technological transformation modifies established ways of working.”

There is also a human dimension that is frequently underestimated. Every technological transformation modifies established ways of working. It challenges habits, expertise, and sometimes existing centers of influence within organizations. Resistance to AI is therefore not necessarily resistance to technology; it is often resistance to organizational change.

Finally, there is an environmental paradox. AI is frequently promoted as a sustainability tool, yet AI itself consumes energy, computing power, and resources. Its legitimacy as a sustainability enabler will ultimately depend on its ability to generate environmental gains that significantly exceed its own footprint.

“AI is frequently promoted as a sustainability tool, yet AI itself consumes energy, computing power, and resources.”

This does not diminish its potential. On the contrary. Leading global food and beverage companies are already demonstrating how AI can improve agricultural practices, optimize production, reduce waste, and enhance supply chain efficiency. What remains rare, however, is a truly integrated approach where materials, data, and capital are managed as part of a single intelligent ecosystem.

This may well represent the next frontier of sustainability. The future winners in our industry will not necessarily be those with access to the most advanced AI technologies. They will be those capable of redesigning their organizations so that information flows as efficiently as materials and capital. In that sense, the challenge facing the juice and beverage sector is not primarily technological. It is strategic, organizational, and cultural.

The future of sustainable business will depend less on the intelligence of machines than on our collective ability to build organizations capable of using that intelligence wisely.



Sustainability Practices in Zimbabwe: Progress, Challenges and Future Prospects

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The Zimbabwe Fruits and Vegetables (F&V) market is valued at USD 2.2 billion, and this growth is expected to accelerate, primarily boosted by three major factors:

- (1) Increasing urbanization,**
- (2) Rising consumer health awareness and**
- (3) central government policy for Agriculture.**

Zimbabwe's fruit and beverage sector is undergoing a rapid shift towards sustainability, mainly due to rising consumer health consciousness among consumers, the expansion of the food processing industry, and technological advancements in agricultural value chains¹. Government policies have also influenced operations of local fruit and beverage companies. Value-addition is currently at the core of the Zimbabwean government's development policy agenda, as it pushes strongly towards ending the perennial and unfortunate challenge of exporting primarily raw commodities from major sectors of the economy, including the food industry. The government sees opportunities for value addition in sectors such as agriculture and food processing and has thus implemented an ambitious strategy dubbed: "The Zimbabwe Agriculture Food Systems Transformation Strategy"². This comprehensive blueprint for agricultural renewal aims to boost food security, sustainability, import substitution, value addition, and youth jobs creation³.

In this report, we highlight some progress in sustainability practices in selected case studies in the fruit and

beverage sectors in Zimbabwe. We assess the sustainability landscape, prospects and challenges in the selected value chains.

Case A: Sustainability and quality management in the citrus fruit value chain in Zimbabwe

Schweppes Holdings Africa Limited (SHAL) is one of a few Zimbabwean organisations that have well established Corporate Sustainability Frameworks that govern their operations to promote green practices and reduce carbon emissions⁴. Over the years, the organisation has worked on attaining international standards certification to various management systems that include ISO 9001:2015; FSSC 22000, Kosher, Halaal, OHSAS 18001 and ISO 45001:2018 Management Systems⁵. The organisation is a large fruit beverage company in Zimbabwe that comprises three business units: Schweppes Zimbabwe Limited (SZL), Beit Bridge Juicing Private Limited (BJP) and Best Fruit Processors (BFP). SZL is a beverage business that operates the non-carbonated beverages franchise for The Coca-Cola Company in Zimbabwe while BBJ and BFP focus on agro processing and value addition of agro produce.

Good waste management is central to the organisation's environmental efforts through primary and secondary PET waste collection schemes in communities. These initiatives have steadily reduced company-generated waste, with the amount of glass waste reducing from 6t – 1t % in 2024. In light of the global fight against climate change, Schweppes Holdings Africa Limited (SHAL) implements the ISO 14001:2015 Environmental Management System as a mechanism for managing en-



Figure 1: 1MW solar plant installation on the rooftop (9000sqm) of Schweppes Zimbabwe Limited (SZL) Harare factory⁸

environmental aspects and to regularly track and monitor greenhouse gas emissions and the carbon footprint. In 2024, the organization reduced its gas emissions from a total of 1494.56t CO₂e recorded in 2023 to 1388.77t CO₂e recorded in 2024. The organisation also reduced its petrol emissions from 38.5 tons CO₂e in 2023 to 21.2 tons, attributed to a shift to light-fuel diesel forklifts. The organisation embarked on an ambitious 1MW solar plant installation on the rooftop (9000sqm) of its Harare facility and intends to roll out 1.96MW installations to the remaining production and sales depots across the country to green the entire business⁶. This 1 MW plant project was the largest rooftop solar project in Sub-Saharan Africa outside South Africa and produces an average of 4,500 kWh of energy on a day with an average demand of 18,000 kWh required for 24-hour plant operations⁷. This contribution from solar has reduced green-

house gases by 2.7 tonnes of Carbon dioxide equivalent on a daily basis and has reduced diesel usage by generators. Solar generation at the plant now contributes 28% of the energy on average. This project is a climate mitigation project that contributes towards the Sustainable Development Goal 7 (SDG7) (Clean and Affordable Energy) and SDG number 13 (Climate Action).

The organisation has also successfully decreased refrigerant emissions by implementing a phased replacement plan for R22 refrigerants, with more environmentally friendly alternatives such as R134A, R404, and R600. Going forward, the company needs to leverage on these sustainability practices to reduce operating expenses through energy efficiency, increasing sales by attracting environmentally conscious consumers, and building resilience against supply chain disruptions.

1. ZimTrade, 'For Secure, Sustainable Exports, There Is Need for Increased Value-Addition'.
2. FAO Regional Office-Africa, 'FAO and Zimbabwe Team up to Transform Agriculture with Innovative Approach to Sustainable Agrifood Systems'.
3. Ken Research, 'Zimbabwe Fruits and Vegetables Market | 2019 – 2030 | Ken Research'.
4. Schweppes Holdings Africa Limited, Sustainability Framework – Schweppes Holdings Africa Limited.
5. Schweppes Holdings Africa Limited, Schweppes Holdings Africa Limited Sustainability Report 2024.
6. Schweppes Holdings Africa Limited, One Mega Watt Solar Plant – Schweppes Holdings Africa Limited.
7. Schweppes Holdings Africa Limited, Schweppes Holdings Africa Limited Sustainability Report 2019.
8. Schweppes Holdings Africa Limited, Schweppes Holdings Africa Limited Sustainability Report 2019.



Empowering Women through Sustainable Juice Production in Nigeria



Patricia Obichukwu, CEO.
Best Produce International UK Ltd

Introduction:

When women are empowered to participate fully in sustainable agricultural value chains, they improve household incomes and reduce poverty, directly contributing to SDG 1 (No Poverty). As women traditionally invest a significant proportion of their earnings in their families' nutrition, health, and education, stronger women-led juice enterprises also support SDG 3 (Good Health and Well-being) by increasing the availability of safe, nutritious, locally produced fruit and vegetable juices while promoting healthier diets. Expanding women-owned businesses generates employment, strengthens local economies, and encourages entrepreneurship, advancing SDG 8 (Decent Work and Economic Growth). Furthermore, ensuring that women, youth, and smallholder farmers have equitable access to markets, finance, technology, and business opportunities helps address structural inequalities, supporting SDG 10 (Reduced Inequalities).

Nigeria possesses abundant agricultural resources capable of supporting a thriving fresh juice industry. Crops such as tiger nuts, pineapples, oranges, sugarcane, ginger and other tropical fruits present enormous opportunities for value addition, employment creation, improved nutrition and export development. Yet much of this potential remains untapped because of weak market linkages, post-harvest losses, inadequate processing technology, limited access to finance and insufficient investment in food safety systems.

In this particular article, we explored the journey of three Nigeria women entrepreneurs in the juice production sector, and below is the summary of their brief story. The following three case studies illustrate both the resilience of Nigerian women entrepreneurs and the investments needed to unlock the country's fresh juice industry.



Case Study 1

Siya Foods: Transforming Tiger Nuts into a Premium Health Beverage



Proprietor:
Ms Irene
Ifunanyachukwu
Nwajiobi

One of the strongest examples of innovation within Nigeria's fresh juice sector is Siya Foods, a women-owned enterprise established in Abuja by Ms Irene Ifunanyachukwu Nwajiobi in 2022. What began as a personal effort to prepare healthier beverages at home quickly evolved into a successful business after colleagues enthusiastically embraced her homemade ti-

ger nut milk. Positive customer referrals created an organic market that encouraged the transition from home production to commercial manufacturing.

Today, Siya Foods produces premium tiger nut Milk made from Tiger Nuts, Dates and Coconut, offering consumers a nutritious dairy-free alternative to carbonated drinks. The company sources premium Tiger Nuts and dates directly from trusted farmers in Bauchi State, Republic of Niger, Dates from Saudi Arabia and Niger, Coconuts from Ghana and Packaging materials from suppliers in Kano and Kaduna States. This diversified regional sourcing strategy helps maintain quality while building a resilient supply chain.

Despite growing demand, expansion remains constrained by limited access to affordable finance, the high cost of NAFDAC registration, inadequate automation and the need for specialised training in food safety, quality assurance and product certification process. Nevertheless, the business already provides a dependable market for suppliers of tiger nuts, dates and coconuts while promoting healthier consumer choices and demonstrating how indigenous crops can become premium value-added products.

Key Lesson:

Siya Foods continue to demonstrate that women entrepreneurs can transform traditional crops into competitive health beverages and if supported through access to finance, product certification, technology and professional training, the business will thrive and create more employment opportunities.

Case Study 2:

Pineapple and Orange Juice Enterprise: Reducing Fruit Losses through Local Processing



Proprietor:
Florence
Dunia



Another inspiring entrepreneur is building a fresh Pineapple and Orange Juice business based on the belief that Nigeria's abundant tropical fruits should be processed locally rather than wasted after harvest. Her enterprise sources fresh pineapples and oranges from farmers and fruit markets around Abuja, creating additional demand for locally grown produce while supplying consumers with fresh natural juice.

Like many processors, she identified poor rural infrastructure, transportation costs, seasonal supply fluctuations, pest and disease pressures and limited farmer financing as major obstacles affecting raw material availability. These challenges increase production costs and contribute to significant post-harvest losses that reduce farmers' incomes.

The entrepreneur also highlighted barriers to business growth, including insufficient finance, expensive processing equipment, high packaging costs, limited access to wider markets and the cost of regulatory compliance. She believes that additional training in food safety, modern juice processing, quality assurance and access to finance would significantly improve efficiency and product consistency while supporting business expansion.

Despite these challenges, the enterprise has employed 11 people and also continues to create value by purchasing fruits from local producers, promoting healthier beverage choices and demonstrating the commercial opportunities that exist within Nigeria's fruit processing sector.

Key Lesson:

Investing in local fruit processing will help to reduce post-harvest losses, strengthens markets for small-holder fruit growers and creates employment opportunities for women and young people.

Case Study 3:

JuicyCane: Creating Value from Sugarcane, Lemon and Ginger



Proprietor:
Ms Salametu
Ojone Abdulai

A third example is JuicyCane, founded in 2019 by Ms Salametu Ojone Abdulai, a woman entrepreneur based in Bwari Area Council, Federal Capital Territory Abuja Nigeria. She was inspired by the desire to establish a business that relied on locally available agricultural resources rather than imported products, she recognised the growing consumer demand for healthy beverages, particularly during the COVID-19 pandemic, when awareness of nutrition and immunity increased.

JuicyCane sources sugarcane and fruits from farms around Abuja and neighbouring Nasarawa State, as well as local traders who aggregate produce from smallholder farmers. One of the greatest challenges identified is transporting fresh produce from rural farming communities to urban markets while maintaining quality.

Although the business has received grants from the Islamic Development Bank through the Bank of Industry and the Tony Elumelu Foundation, accessing commercial finance remains difficult because of collateral requirements and the entrepreneur's preference for non-interest (Halal) financing. She has, however, invested in professional development by completing HACCP food safety training together with several business development programmes, enabling the company to strengthen its operations.



Current production uses an industrial juicer and packaging machine, but future growth depends upon investment in solar-powered cold rooms,

permanent factory premises, wider distribution networks and stronger marketing capacity. The entrepreneur explained that reliable cold-chain infrastructure would enable distributors to maintain product quality while expanding into new markets.

Beyond commercial success, JuicyCane has created employment for 7 people, provided reliable markets for sugarcane farmers, supported household incomes and promoted healthier lifestyles within local communities. Looking ahead, the entrepreneur believes Nigerian women are ready to transform the country's abundant fruits and vegetables into globally competitive healthy beverages if provided with the right enabling environment, international partnerships and technical support.

Key Lesson:

JuicyCane illustrates how innovation, technical training and strategic investment in cold-chain infrastructure can unlock entirely new markets for traditional crops while creating employment and improving rural livelihoods.

Common Challenges across the Three women:

- The primary barriers have been the stringent collateral requirements and the high interest rates associated with microfinance lending, which are not conducive to the sustainable growth of an early-stage business.
- High Cost of NAFDAC registration fees
- Poor access to specialized industry training in juice processing, food safety, or business management.
- Lack of investment in advanced automated processing, packaging, and quality-control technology would be highly beneficial

Support Needed by the three women entrepreneurs:

Although each business produces different beverages, the interviews revealed remarkably similarities in priorities for strengthening their businesses and Nigeria's juice value chain as a whole:

The cross-cutting desires are for:

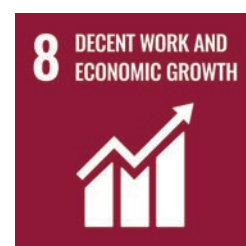
- Their needs to build strong partnerships with smallholders' farmers.
- Access to finance and investment capital.
- Food safety training, certification and regulatory compliance.
- Access to modern processing and packaging technology.
- Need for Cold-chain infrastructure.
- Business management and technical training.
- Improved domestic and international market access.
- Sustainable value addition that reduces post-harvest losses.



In conclusion, the above case studies have collectively demonstrated that women entrepreneurs are not only processors of agricultural products but also important drivers of rural development, nutrition, employment and inclusive economic growth. Therefore, with adequate access to finance and modern technology, they will be able to increase their capacity and create more employment.

Moreover, to fully realise Nigeria's fresh juice potential, coordinated action is required from government, development partners, financial institutions and the private sector to:

- Strengthen farmer–processor partnerships through contract farming and cooperative aggregation.
- Expand access to affordable finance, including women-friendly and ethical financing models.
- Support compliance with NAFDAC, HACCP, Good Manufacturing Practices (GMP) and Good Agricultural Practices (GAP).
- Invest in modern processing facilities, renewable energy and cold-chain logistics.
- Provide specialised International technical and business management training on juice production.
- Facilitate regional and international market access through certification, branding and export promotion.





Nature as Infrastructure: A New Business Model for Resilient Industry

Paula Dip, Quality & Sustainability Manager, Vicente Trapani Argentina S.A.

A New Way of Talking About Biodiversity

For decades, industry has understood infrastructure as the set of physical assets that make production possible: roads, processing plants, irrigation systems, energy, storage facilities, and logistics.

However, there is another form of infrastructure, equally essential, that rarely appears on a financial balance sheet: nature.

Forests, soils, microorganisms, pollinators, waterways, and species sustain and nourish energy flows, maintain ecological balance, and form a living infrastructure that supports production every day. Without it, no production system can be sustained in the long term.

The Hidden Cost of Losing Natural Infrastructure

Companies know exactly how much it costs to build a processing plant or install an irrigation system. However,



Companies begin investing resources to replace processes that were once provided by nature.



very few could estimate the cost of replacing the services currently provided by a healthy ecosystem.

What would it cost to artificially replace natural water infiltration, soil formation, microclimate regulation, carbon storage, or the biological control of pests?

The answer would likely be the same in every case: **economically unfeasible.**

When ecosystems lose their functionality, costs that were once invisible begin to emerge: the need for fertilizers, crop protection products, and irrigation increases; erosion intensifies; vulnerability to extreme weather events grows; and yields become more variable.

From Measuring Impacts to Managing Infrastructure

For many years, sustainability strategies focused primarily on reducing environmental impacts. Today, that approach is no longer sufficient.

If we accept that nature is infrastructure, then it must be managed with the same level of planning, monitoring, and continuous improvement as any other strategic business asset.

This requires generating scientific knowledge, measuring performance, assessing risks, establishing indicators, and making evidence-based decisions—transforming biodiversity from an isolated environmental program into an integral component of business strategy.

“Nature is the infrastructure that quietly supports every harvest, every processing plant, every supply chain and, ultimately, every business that depends on agriculture.”



Trapani Bio

Science for Nature. Resilience for Business.

In Vicente Trapani, this paradigm shift gave rise to Trapani Bio, a strategic framework that integrates all initiatives related to biodiversity, water, climate, forests, and landscape through a management system designed to understand, protect, and strengthen the natural infrastructure that supports citrus production.

Strategic Pillar	Purpose	Key Actions	Roadmap
Landscape Governance	Understand the territory and manage the landscape as a functional unit.	Protected Productive Landscape (PPP), farm characterization, GIS mapping, landscape baseline and landscape indicators.	2026: Complete the landscape baseline and indicators. 2027–2029: Periodic landscape monitoring, land-use change assessment and wildfire monitoring.
Forests & Natural Capital	Conserve and strengthen forest infrastructure.	Forest inventories, permanent monitoring plots, carbon stock assessments, forest management and ecological restoration.	2026: Implement restoration plans. 2027: First re measurements. Every 3–5 years: Update forest inventories and carbon stock assessments.
Biodiversity Intelligence	Generate scientific evidence to support decision-making.	Monitoring of mammals, amphibians and birds; ecological connectivity assessments; identification of indicator species.	2026–2029: Continue biodiversity monitoring and integrate findings into adaptive management.
Climate, Carbon & Energy	Integrate biodiversity, climate action and energy management.	Corporate Carbon Footprint, Product Carbon Footprint, Life Cycle Assessment (LCA), Scope 3 emissions, SBTi targets, renewable electricity and energy efficiency initiatives.	2026: Achieve 25% renewable electricity and complete SBTi target validation. 2027: Begin implementation of the SBTi roadmap. From 2028 onwards: Annual monitoring, reporting and continuous improvement.
Water Stewardship	Protect the ecosystem services associated with water resources.	Agua de Raíz project, watershed conservation, soil health and continuous improvement of irrigation efficiency.	2026: Consolidate the project. 2027–2030: Collaborative monitoring and strengthening of watershed resilience.
Collective Action	Manage the landscape in collaboration with key stakeholders.	Active participation in the Aconquija Protected Landscape (PPA) together with Fundación ProYungas, scientific and educational institutions, local communities and other companies.	Strengthen the initiative's provincial recognition. Support the reintroduction of the Lowland Tapir. Expand environmental education and promote sustainable local development.



Trapani BIO

-From Understanding Nature to Managing Natural Infrastructure-



The Evolution of Trapani Bio

Trapani Bio did not emerge as a standalone project. It evolved as a long-term strategy, growing alongside our understanding of the landscape and the ecosystem services that sustain agricultural production.

Resilient production is based on two inseparable infrastructures: a healthy natural infrastructure, capable of providing essential ecosystem services, and an increasingly efficient industrial infrastructure that understands, optimizes, and harnesses energy flows to move toward decarbonized production.

“Seeing nature as infrastructure may be one of the most important shifts in sustainability thinking over the coming decade.”

For many years, companies have measured the impact they have on nature. The next challenge is to understand how much their future depends on the proper functioning of nature.

Managing natural infrastructure means measuring, conserving, restoring, and strengthening it with the same rigor used to manage any other strategic asset.



Our Net Zero Journey: Transforming the Citrus Industry Toward a Sustainable Future

Agustina Lucci, Sustainability Manager at Citrusvil Argentina



San Rafael Orchard, Lules, Tucumán, Argentina

The validation of our science-based targets and our decarbonization efforts reinforce Citrusvil's climate commitment and strengthen the resilience of its value chain, as well as its competitiveness in global markets.

At Citrusvil, we view sustainability as a comprehensive commitment that goes beyond environmental care. It means building more resilient supply chains, creating greater value for our clients, and strengthening our competitiveness in markets that are increasingly demanding in terms of climate performance, transparency, and responsible sourcing.

The climate crisis is a global priority. We believe that addressing this challenge is not an option, but an essential part of our management as an agro-industrial company.

In 2025, we reached a new milestone in our sustainability strategy by getting our net-zero emissions target for 2050 validated by the Science Based Targets initiative (SBTi), and the scope of this commitment encompasses our entire value chain.

This validation confirms that our climate roadmap is aligned with science and with the Paris Agreement's goal of limiting global warming to 1.5 °C.

When Sustainability Strengthens the Business

We understand that decarbonization is not an isolated initiative, but rather part of a comprehensive strategy outlined in our Sustainability Policy, which combines various environmental, social, and governance aspects. Our climate action, energy efficiency, operational excel-



Citrusvil's Plant in Ceivil Pozo, Tucumán, Argentina

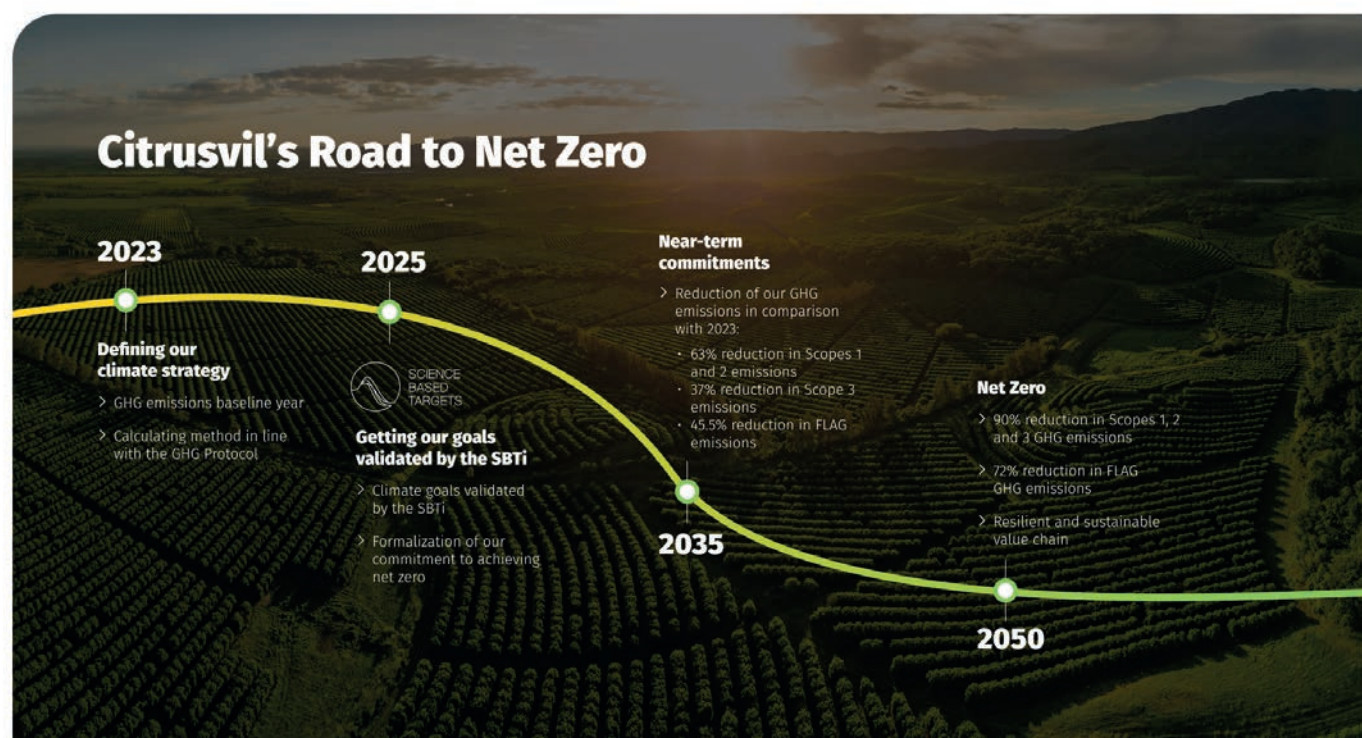
lence, and responsible sourcing and quality are all part of our long-term vision aimed at transforming our production model and moving toward Net Zero.

In our decarbonization strategy, we have set emission reduction targets for **2035**, using 2023 as our baseline.

As part of our short-term commitments, we will reduce the carbon footprint of our direct industrial operations by **63%** and the indirect emissions from sourcing and distribution by **37.5%**. In addition, we will reduce the

emissions related to farming and agricultural production to **45.5%**, while strictly upholding our historic commitment to **zero deforestation**.

Looking ahead, our goal for 2050 is even more ambitious: we aim to become a net-zero emissions company. This involves decarbonizing 90% of our direct and indirect industrial activities and reducing the environmental impact of agricultural production and soil management by 72%.





The validation by the SBTi confirms that these targets meet the highest international standards for corporate climate action and provide a clear roadmap toward decarbonization. As a milestone, **we ended 2025 with 85% of the energy used in our operations coming from renewable sources**; this sustained operational transformation is a key pillar of our climate strategy.



With a Focus on the Client

Rather than simply adapting to new demands, we work alongside our clients to anticipate them. The future of the lemon industry will depend not only on product quality but also on the ability to offer sustainable, verifiable solutions that align with the expectations of clients, regulatory agencies, and international markets.

In this context, we are driving the sector's sustainable transformation through our participation, since 2023, in the Sustainable Juice Covenant (SJC), a global initiative

“...we will reduce the carbon footprint of our direct industrial operations by 63% and the indirect emissions from sourcing and distribution by 37.5%.”

that aims to achieve a 100% sustainable supply of juices, concentrates, and purees by 2030.

Our participation in this alliance reaffirms our purpose: driving a more responsible agro-industrial sector requires cooperation, operational transparency, and verifiable standards from the source in the field all the way to the end product.



The
Sustainable Juice
100% sustainable juice by 2030
Covenant





Advancing Regenerative Citrus Farming in Brazil

Gustavo Melchiori, Global Sustainability and Project Manager. LDC

From ambition to action in the world's most strategic orange juice origin

Citrus farming—particularly in Brazil, the world's largest orange juice origin—is increasingly shaped by evolving climatic, environmental and market expectations. Climate variability, evolving diseases pressure and rising temperatures are increasingly challenging citrus farming systems and production, highlighting the need to further strengthen long term farm resilience and ecosystem performance.

Improving crop resilience is essential to ensure the productivity of the sector and secure long-term supply. In this context, regenerative agriculture offers a practical

pathway focusing on improving ecosystem functions while maintaining agronomic and economic viability.

In LDC-managed citrus farms, the advanced regenerative farming practices being tested build on practices that are already proven, while addressing emerging challenges that become more visible as climatic and operational conditions continue to change.

LDC's global ambition for regenerative agriculture

As a leading global merchant and processor of agricultural commodities, Louis Dreyfus Company (LDC) has committed to **advancing regenerative agriculture practices across diverse commodities in at least**



three million acres by 2030. This ambition is part of LDC's broader sustainability strategy to strengthen supply-chain resilience, reduce environmental impacts and support customers in achieving their sustainability and decarbonization objectives.

LDC's approach to regenerative agriculture is grounded in the recognition that effective solutions must be **locally adapted, science-based** and **economically viable**. Programs are therefore designed crop-by-crop and region-by-region, considering each agronomic reality, farmer livelihoods and downstream market expectations.

Shaping an advanced regenerative citrus pathway in Brazil

Within this global ambition, LDC's Juice platform has developed the **Advanced Regenerative Citrus Program in Brazil**, co-designed with value chain partners. Brazil's citrus belt—primarily across São Paulo and Minas Gerais states—represents the world's largest orange juice origin and offers a unique opportunity to pilot regenerative agriculture at meaningful scale.

The program is structured as a **multi-year transition and learning journey**, aiming to enhance existing citrus farming protocols through a regenerative agriculture lens adapted to large-scale commercial production. Its objectives include:

- Developing a **locally adapted regenerative protocol** for the Brazilian citrus belt.
- Piloting regenerative approaches in **mature orchards (brownfield)**.
- Monitoring outcomes related to **soil health, biodiversity, water, carbon emissions and farm resilience**.
- Building the **foundations for future scale-up**, both within LDC-managed farms and, over time, with third-party growers.

Initial pilots on LDC-managed farms allow practices to be tested and refined before broader deployment.



A future-proof and science-based framework

LDC's Advanced Regenerative Citrus Program is aligned with the [Sustainable Agriculture Initiative \(SAI\) Platform's Regenerating Together Program \(RTP\)](#). The RTP is an outcome-focused framework that enables regenerative transitions across supply chains, structured around five impact areas—soil, biodiversity, water, climate and livelihoods—and supported by a robust system of metrics, assessment tools and practical transition guidance designed for global scalability and local adaptation.

Alignment with the SAI Platform RTP enables the use of shared definitions, comparable indicators and credible monitoring approaches, while facilitating collaboration across the value chain. The program is implemented in close collaboration with technical partners, including [Soil Capital Farming](#), which provides regenerative agronomic expertise, working alongside LDC's citrus farming experts. This collaboration combines field-level expertise with structured data collection, supporting continuous learning throughout the pilot phases.

Rather than prescribing a fixed set of practices, LDC's Advanced Regenerative Citrus Program focuses on testing **portfolios of regenerative practices** and evaluating their outcomes over time. These include approaches aimed at improving soil structure and biological activity, enhancing on-farm biodiversity, strengthening water cycle regulation and optimizing input use.

The program acknowledges that regenerative transitions in perennial crops require time. Early phases therefore focus on establishing robust baselines, transparent methodologies and credible partnerships. At this stage of the program, success

is not measured by immediate performance claims, but by the relevance of the agronomic testing, the quality of data generated, and the strength of collaboration across stakeholders.

Collaboration across the value chain

Engaging customers early and fostering long term partnerships are key elements of LDC's Advanced Regenerative Citrus Program approach, helping align agronomic innovation with downstream expectations and market signals.

This collaborative model reflects a shared understanding that advancing regenerative citrus farming requires coordinated action across stakeholders—from farming to processing, financing and end markets.

Looking ahead

LDC's Advanced Regenerative Citrus Program in Brazil represents a structured learning journey rather than a finished model. By combining local adaptation, science-based frameworks and value-chain collaboration, LDC aims to contribute to the progressive transformation of citrus farming.

As insights from the pilot phase are consolidated, the program is expected to inform future iterations and broader adoption, supporting more resilient farms, healthier ecosystems and a more sustainable juice sector over the long term.



Working with Ecuatorian Farmers to Build Healthier Soils

Harry Frei and Camila Tamayo, Business Development Manager and CRS & Sustainability Group Lead. Quicornac. Ecuador

In Ecuador, passion fruit farming is closely connected to the livelihoods of many rural families. For Quicornac, supporting this value chain means not only purchasing fruit, but also working alongside farmers to strengthen the way passion fruit is cultivated over time.

During 2025, Quicornac's agronomy team carried out workshops with passion fruit growers across the provinces of Esmeraldas, Manabí, and Santo Domingo, with a focus on organic fertilization and soil management practices. The objective was practical: to share knowledge that farmers could apply directly in their fields using locally available resources.

The sessions focused on the preparation and application of organic fertilizers as a complement to traditional crop nutrition practices. Through these activities, dozens of new farmers learned how organic materials can help improve soil structure, support biological activity,

and contribute to better nutrient availability for the crop.

This work also responds to a very real challenge faced by smallholder producers: the need to manage costs while maintaining productivity. By promoting the responsible use of inputs and encouraging alternatives that can be prepared with locally available materials, the initiative helps farmers reduce their dependence on synthetic agrochemicals and make more efficient use of the resources available to them.

Our workshops also created space for broader conversations about soil health and a deeper understanding of sustainable farming practices. Farmers and our team of technicians discussed the importance of maintaining organic matter, protecting soil life, and building production systems that are better prepared to face changing environmental conditions.

For Quicornac and for our industry, this initiative is part of a gradual process. It is not about changing farming practices overnight, but about sharing tools and knowledge, encouraging learning, and supporting our smallholder farmers as they take practical steps toward more sustainable production and a more sustainable future.

By focusing on soil health, farmer training, and responsible agricultural practices, we at Quicornac continue to contribute to a more resilient passion fruit value chain in the heart of Ecuador — one that supports real productivity, sustainable rural livelihoods, and the long-term care of our beloved natural resources.



Sharing Knowledge to Strengthen Passion Fruit Production in Northern Peru

Harry Frei and Camila Tamayo, Business Development Manager and CRS & Sustainability Group Lead. Quicornac. Ecuador

In northern Peru, Quicornac has focused its sustainability efforts on knowledge sharing and collaboration with the agricultural sector over the last decade. Passion fruit production depends on the work of thousands of farmers, dozens of technicians, many researchers, various public institutions, and private processing companies, and progress is much stronger when these actors are connected.

Through multiple technical workshops, many field days, and knowledge exchange forums such as the “Congreso de las Passifloras,” Quicornac and the local industry have created spaces where hundreds of Peruvian farmers can access up-to-date information and practical tools to improve their production practices. These activities bring together different participants from the passion fruit value chain and allow technical knowledge to reach the field more directly.

The topics discussed across these forums and workshops include crop nutrition, soil health, integrated pest and disease management, irrigation efficiency, climate adaptation, and new research related to passion fruit cultivation. For producers, these exchanges are an opportunity to ask questions, compare experiences, and make better-informed decisions for their farms.

This type of work is especially important because many sustainability challenges in agriculture cannot be solved by one actor alone. Improving productivity, managing pests, using water efficiently, and adapting to changing climate conditions all require coordination and continuous learning.

One of our roles in leading this industry is not only to help facilitate that process in Peru, but also to connect farmers with technical experts, institutions, researchers, and industry professionals. Through this work, the company contributes to a more informed and better-prepared agricultural sector.

The value of these initiatives goes beyond the individual workshops, field days, or seminars. Each meeting helps build trust, strengthen relationships, and encourage collaboration among people who share a common interest in the future of passion fruit production.

For Quicornac, sustainability is not only about environmental practices. It is also about building capacity, supporting rural competitiveness, and creating the conditions for Peruvian farmers to continue improving over time.

By promoting collaboration and practical knowledge, we at Quicornac want to continue supporting a more resilient Peruvian passion fruit value chain — one where farmers, institutions, and companies can work together toward more sustainable agricultural development.



Cranberry Pomace Bioactive Content and Valorization Opportunities

Christina Khoo, Director, Emerging Science, Nutrition, & Regulatory Affairs
Ocean Spray Cranberries, Inc. USA



Background

The North American cranberry, *Vaccinium macrocarpon*, is one of three endogenous North American crops commercially cultivated. The cranberry is commercially cultivated in the United States, Canada, and Chile. It is well-known for delivering health benefits through its bioactive components; the most well-researched being the polymeric flavan-3-ol, Proanthocyanidins with A type bonds, and other flavonoids including the flavonols quercetin and myricetin, and anthocyanins. The result of many years of clinical studies allowed certain cranberry products to be acknowledged by the FDA with a qualified health claim for reducing the risk of recurrent urinary tract infections in healthy women, making it the only food with a health claim for reducing the risk of an acute infection.

The cranberry is a tart fruit with only 4-5 g of sugar in 100 g and is generally made into juice and dried fruit and not often consumed fresh. The side-stream from juice production, called pomace, has been well-characterized for its bioactives as described in many publications. Because many of these compounds remain in processing side streams, valorization of cranberry pomace offers opportu-



nities to create functional ingredients for human and pets, while reducing food waste.

The pomace contains about 65-75% moisture before drying. Drying technologies that preserve bioactive compounds in the side stream are actively being examined, while different extraction protocols have already been conducted to understand the bioactive composition of the pomace. Numerous extraction approaches, including hot water, alkaline, microwave-assisted, subcritical water, and enzymatic treatments, have been evaluated to characterize pomace bioactives. More recently, Zou et al. (2025) used an innovative sequential drying and supercritical CO₂ extraction process that recovered a multitude of both lipid- and water-soluble bioactives.

Bioactives in Cranberry Side-stream

Cranberry pomace contains a diverse range of bioactive compounds that contribute to its commercial and nutritional value. According to White et al, the composition of dried cranberry pomace was 4.5% moisture, 2.2% protein, 12.0% fat, 65.5% insoluble fiber, 5.7% soluble fiber, 8.4% other carbohydrates, 1.1% ash, and 0.6% total polyphenolics. Total polyphenols include anthocyanins and flavonols, procyanidins with degrees of polymerization (DP) of 1–6, with A type DP2 procyanidins being the most abundant, as well as polymeric PACs (White et al, 2010, Aleed et al 2026). Other components found in the pomace include phenolic acids and triterpenoids.

Oligosaccharides

Aleed et al (2026) determined that the fiber content ranges from approximately 55-80%, with the content predominantly hemicellulosic polysaccharides, high MW polysaccharides, pectic oligosaccharides, and a small but biologically active mixture of oligosaccharides. These

oligosaccharides were characterized by Hotchkiss et al (2015) to contain arabinoxyloglucan and demonstrated to have prebiotic potential (Ozcan, 2017).

Polyphenols

Cranberry pomace is also a source of polyphenols, particularly the dimeric and polymeric type A PACs and quercetin, compounds associated with many of cranberry's well-documented health benefits. Extraction of the pomace polyphenol content showed that the extract had antioxidant activity associated with the Type A PACs and polyphenol content (Otieno 2026).

Pentacyclic Triterpenoids

Another important group of compounds found in the cranberry pomace is triterpenoids, shown in the publication of Xue et al (2026) to contain about 64,090 µg /g DW, with the most abundant being ursolic acid and oleanolic acid. A recent publication by the same group showed that extracts from the pomace contain triterpenoids and phytosterols with anti-inflammatory and anti-proliferative activity in cell culture studies (Mia 2026).

Conclusion

Adding pomace to products may potentially add antioxidant and polyphenol benefits to the product, as shown by one research group that added pomace to functional biscuits, and another where it was added to yogurt (Matlok 2026, Varnaitė 2022). A commercially available extract has also been formulated to include a blend of polyphenols and oligosaccharides with supporting prebiotic evidence (Lessard-Lord 2024). Cranberry fiber has also been tested in a canine formulation in combination with other fibers showing beneficial short chain fatty acid production (Jewell 2022).

The pomace is not the only side-stream material that is being examined for valorization as described in our sustainability report (see link below). Valorization of cranberry seeds is a great success story as the seeds and seed oil have been commercialized as ingredients. The seeds deliver a source of protein and fiber while the seed oil has antioxidants and omega 3 fatty acids. In 1930, three innovative farmers, Marcus Urann, Elizabeth Lee, and John Makepeace joined forces to form the Ocean Spray Cooperative. Around 700 farmers now make up our vibrant cooperative. Cranberry pomace represents a valuable source of polyphenols, oligosaccharides, fiber, and triterpenoids that can be incorporated into functional foods, supplements, and pet nutrition products, with potential

applications ranging from antioxidant and prebiotic ingredients to gut-health solutions. Together with the successful commercialization of cranberry seeds and seed oil, these efforts demonstrate how side-stream valorization can support our goals to reduce waste, increase ingredient value, and support human and animal health.

[Sustainability | Ocean Spray](#)

References:

Yun Zou, Lay Kien Yang, Christian Hermansen, Md Mahabubur Rahman Talukder, Melanie Weingarten, Nur Eka Fitriani, Mario Wibowo, Yoganathan Kanagasundaram, Christina Khoo, Lai Yeng Lee, Jun Wei Ng, Sreenivasa Reddy Puniredd; Sequential Drying and Extraction of Lipids and Bioactives from High-Moisture Food Side Streams Using Supercritical Carbon Dioxide: A Novel Approach to Side-Stream Valorization. ACS Sustainable Resour. Manage. 23 October 2025; 2 (10): 1966–1976.

Brittany L. White, Luke R. Howard, Ronald L. Prior; Proximate and Polyphenolic Characterization of Cranberry Pomace†. J. Agric. Food Chem. 14 April 2010; 58 (7): 4030–4036.

Aleed et al Comparative extraction approaches of cell wall polysaccharide from cranberry pomace sources: aqueous, alkaline and enzymatic extractions. LWT-Food Science and Technology 246:119280 (2026)

Özcan E, Sun J, Rowley DC, Sela DA. A Human Gut Commensal Ferments Cranberry Carbohydrates To Produce Formate. Appl Environ Microbiol. 2017 Aug 17;83(17):e01097-17.

Otieno M, De Pra E, Thatcher R, Neto C. Antioxidant Recovery from Massachusetts Cranberry Pomace: The Role of Solvent. Antioxidants (Basel). 2026 May 29;15(6):682. doi: 10.3390/antiox15060682. PMID: 42351988; PMCID: PMC13295805.

Xue, L.; Carreiro, B.; Mia, M.S.; Paetau-Robinson, I.; Khoo, C.; Neto, C. Pentacyclic Triterpenoid Content in Cranberry Raw Materials and Products. Foods 2024, 13, 3136.

Mia MS, Li H, Chen Y, Ferreira T, Siraj MA, Faruque M, Ma H, Khoo C, Christman L, Neto C. Characterization of Anti-Inflammatory and Anti-Proliferative Triterpenoids and Phytosterols from Cranberry Pomace. Molecules. 2026 Aug 15;31(16):2853.

Varnaitė L, Keršienė M, Šipailienė A, Kazernavičiūtė R, Venskutonis PR, Leskauskaitė D. Fiber-Rich Cranberry Pomace as Food Ingredient with Functional Activity for Yogurt Production. Foods. 2022 Mar 6;11(5):758.

Matlok N, Piechowiak T, Kapusta I, Balawejder M. From By-Product to Bioactive Molecular Ingredient: The Impact of Cranberry Pomace on Antioxidant Properties and Enzyme Modulation in Functional Biscuits. Int J Mol Sci. 2025 Sep 16;26(18):9002.

Lessard-Lord J, Roussel C, Lupien-Meilleur J, Gagnéux P, Richard V, Guay V, Roy D, Desjardins Y. Short term supplementation with cranberry extract modulates gut microbiota in human and displays a bifidogenic effect. NPJ Biofilms Microbiomes. 2024 Mar 6;10(1):18.

Jewell, D.E.; Jackson, M.I.; Cochrane, C.-Y.; Badri, D.V. Feeding Fiber-Bound Polyphenol Ingredients at Different Levels Modulates Colonic Postbiotics to Improve Gut Health in Dogs. Animals 2022, 12, 627.



Touching Lives Through Sustainable and Responsible Business

Arab Beverage Association (ABA) and Technica. Lebanon

Guided by our value of Touching Lives, Technica works closely with Arab Beverages Association members and partners to advance efficiency, sustainability, and responsible business practices. Together, we are committed to creating lasting value for our employees, customers, communities, and the environment through initiatives that support long-term sustainable growth.

I- Environmental Sustainability:

Climate pledge signatory: Technica is signatory of the climate pledge. Together with 500+ companies, we're tackling the climate crisis and committed to achieving net-zero by 2040.

Clean Energy & Resource Efficiency: As part of our commitment to responsible resource management, Technica continued to invest in initiatives that improve energy efficiency and reduce its environmental footprint. Major projects included the installation of a solar energy system, the complete transition to LED lighting across our facilities, the acquisition of energy-efficient machinery to reduce reliance on fossil fuels, and the implementation of smart energy monitoring systems.

To maximize the long-term benefits of these investments, Technica also continued to maintain and optimize its renewable energy and energy-efficiency infrastructure, ensuring sustained operational performance and ongoing reductions in environmental impact.

Reforestation Initiative: As part of our commitment to environmental sustainability, Technica plants one tree for every €100,000 in orders secured. In partnership with the Lebanon Reforestation Initiative (LRI), each tree is planted in the name of the respective customer, recognizing their contribution to a more sustainable future.

This initiative reflects our dedication to environmental stewardship while expressing our appreciation to our valued customers. Together, we are contributing to the res-

toration of Lebanon's green landscapes and planting the roots of a greener, more sustainable future.

II- Commitment to the United Nations Global Compact (UNGC)

Technica is a proud participant in the United Nations Global Compact (UNGC) and has successfully completed both the Communication on Progress (CoP) and Forward Faster questionnaires, demonstrating our commitment to the UNGC's Ten Principles covering human rights, labour, environmental stewardship, and anti-corruption.

In addition, we have signed the UN Global Compact commitments to **Gender Equality** and **Living Wage**, reaffirming our dedication to fostering an inclusive workplace, promoting fair compensation, and advancing sustainable business practices.

We are also signatory of the UN women and committed to empowering women within our organization through various development opportunities and support systems.

III- Ethical Business Practice

As part of the company's objectives to create a safe and open environment for communication, we launched the whistleblower platform. This independent third-party platform allows employees and stakeholders to report issues related to fraud, corruption, harassment, money laundering, data privacy and security and other concerns. It guarantees anonymity and/or confidentiality and ensures non-retaliation for any individuals who raise issues in good faith.

technica™

Technica Sustainability Initiatives





A PERSPECTIVE FROM TÜRKİYE'S EXPORT-ORIENTED FRUIT JUICE INDUSTRY AHEAD OF COP31

From Belém to Antalya: Bringing the Hidden Middle of Food Value Chains into Focus

İpek İŞBİTİREN, Secretary-General
MEYED-Turkish Fruit Juice Industry Association



When the global climate community gathered at COP30 in Belém in November 2025, the fruit and vegetable juice sector reached an important milestone. For the first time, IFU participated in a United Nations Climate Change Conference, joining a high-level roundtable convened by UNIDO for the launch of the **Coalition on the Hidden Middle of Food Value Chains**. The discussion brought greater visibility to the processing, packaging, storage, transport and distribution activities that connect agricultural production with consumers but are often overlooked in food-system debates.

The road now leads from Belém to Antalya, where COP31 will take place from 9 to 20 November 2026. The COP31 Presidency has positioned the conference around implementation: translating commitments into practical action and measurable results. Its Action Agenda includes sustainable and resilient food systems, climate-resilient agriculture, zero waste, green industrial transformation and stronger links between climate objectives and investment. Viewed together, these priorities give the hidden middle particular relevance.

For MEYED—the sole industry association dedicated to Türkiye's fruit juice sector and a member of IFU—this tran-

sition from COP30 to COP31 offers a valuable perspective. Türkiye is not only the host of the next climate conference; it is also a major fruit-producing country with an established processing industry connected to international markets. This places the Turkish juice sector at the intersection of agriculture, industrial value creation and global trade.

MEYED's sector data illustrates the scale of that connection. Approximately 10% of Türkiye's annual fruit harvest is processed by the industry through 45 facilities across 18 provinces. The sector records double-digit export growth and a foreign-trade surplus averaging 95%. Processing can increase the economic value of agricultural products by four to seven times. These figures are not simply indicators of industrial capacity. They show how the hidden middle can transform perishable agricultural output into safe, accessible and tradable products while supporting economic activity across producing regions.

The same position also makes the sector highly aware of climate-related interdependence. A fruit juice value chain begins in orchards and fields, where yields, quality and harvest schedules are influenced by changing temperatures, water availability, drought, frost, hail and irregular rainfall. Their effects then move through the chain, shaping raw-ma-

terial availability, factory utilisation, production planning, costs and trade flows. Climate resilience in this context is therefore more than an environmental objective. It is closely connected to food availability, rural value creation and the continuity of international supply.

COP31's food-security agenda recognises food, water and climate as a single interdependent system and identifies climate-resilient agriculture as a core area. The **hidden-middle perspective** complements this approach by extending attention beyond primary production. Agricultural resilience can deliver its full value only when products can also be processed efficiently, preserved safely, transported reliably and connected to markets. Conversely, processing industries remain dependent on the resilience of the agricultural systems from which they source.

Core message: Climate-resilient agriculture, responsible processing and reliable international trade should be treated as interconnected parts of one food system, capable of sustaining value from production through consumption.

This relationship also brings international trade into the climate discussion. Export-oriented food industries operate across markets with different environmental expectations, measurement systems and reporting practices. Scientifically grounded and comparable approaches can help climate performance be understood more consistently across products and production regions. Predictability can support investment, while recognition of differing agricultural and national conditions can help ensure that practical solutions remain relevant. Climate objectives and reliable, rules-based trade need not be competing considerations; together, they can contribute to more resilient food value chains.

The movement from Belém to Antalya therefore represents more than a change of venue. COP30 helped bring the hidden middle into the food-systems conversation. **COP31 can deepen that perspective through its emphasis on implementation, resilience and measurable progress.**

Türkiye's fruit juice industry provides one practical illustration of the connections involved: between orchards and processing facilities, resource efficiency and value creation, domestic production and international markets.



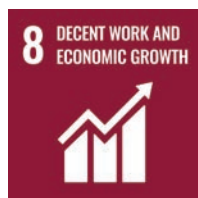
Export-oriented industries need scientifically grounded, comparable and predictable approaches to environmental measurement and reporting, while allowing for different agricultural and national circumstances. Climate goals and reliable, rules-based trade can reinforce rather than undermine one another.

Antalya offers an opportunity to view these elements not as separate agendas but as parts of the same system. Climate-resilient agriculture, responsible processing and reliable international trade are interconnected foundations of food systems capable of sustaining value from production to consumption.

MEYED, together with its members, reaffirms its commitment to contributing its knowledge, experience and collaborative capacity to the transition towards more resilient and sustainable food value chains. This commitment reflects a shared understanding that meaningful progress depends on cooperation across the entire chain—from agricultural production and processing to distribution and international markets.

We sincerely hope that COP31 will conclude successfully, guided by ambitious yet realistic objectives and capable of translating international climate commitments into practical, measurable and achievable steps. Such an outcome would provide valuable direction for governments, industries and other stakeholders working to turn climate ambition into lasting progress.

More information: <https://cop31.tr/>





Giving New Value to Passion Fruit By-Products

Harry Frei and Camila Tamayo, Business Development Manager and CRS & Sustainability Group Lead. Quicornac. Ecuador

In Vietnam, our sustainability efforts extend beyond fruit processing. By recognizing the value of every part of the passion fruit, we at Quicornac are transforming processing by-products into resources that support more sustainable agriculture and strengthen local farming communities.

A significant share of the organic residues generated during passion fruit processing is recovered and incorporated into the production of organic fertilizers. Combined with local livestock manure from Vietnam's Central Highlands and other agricultural materials, these by-products are converted into nutrient-rich amendments that help improve soil fertility and structure across a wide range of crops.

Returning these nutrients to the soil supports healthier and more productive agricultural systems. Organic fertilizers enhance soil organic matter, improve water retention, stimulate beneficial microbial activity, and contribute to long-term soil health. As a result, we are helping local farmers gradually reduce their dependence on synthetic fertilizers and other chemical inputs while maintaining productive fields.

This circular approach delivers tangible benefits for smallholder farmers. By providing access to locally produced organic fertilizers, it helps lower production costs, supports the more efficient use of agricultural resources, and promotes the adoption of good agricultural practices. At the same time, it creates value from materials that would otherwise become waste, closing the loop between food processing and crop production.

Beyond fertilizer production, Quicornac continues to explore additional opportunities to maximize the value of passion fruit by-products in Vietnam, ensuring that natural resources are used as efficiently as possible throughout the value chain.

By giving passion fruit residues a second life, we at Quicornac demonstrate how circular economy principles can generate shared value in Vietnam — reducing waste, improving soil health, supporting sustainable farming, and contributing to the long-term resilience of agricultural communities.



AIJN sustainability strategy: from common vision to collective action



Justine Pradels, Sustainability and Regulatory Affairs Manager, AIJN

Sustainability is a defining priority for the European fruit juice sector. While companies have made strong progress individually, many environmental and social challenges remain systemic and require coordinated action. Several sustainability managers from companies of different sizes have highly encouraged AIJN to open discussions at EU level to help them and the juice sector in their sustainability journey. In response, AIJN launched its Sustainability Strategy in 2025 to give the European fruit juice industry a shared framework. Developed with these sustainability experts, the strategy addresses three sector-wide challenges:

- Developing more sustainable and resilient supply chains;
- Creating a shared understanding of sustainable sourcing and how to measure it;
- Improving the availability and quality of ESG environmental, social and governance data.

The strategy aligns the sector around four complementary pillars:

- **Providing further guidance on sustainability standards;**
- **Improving ESG data availability and quality;**
- **Collaborating on sector-wide impact areas through the Sustainable Juice Covenant (SJC) and Sustainable Juice Platform (SJP);**
- **Using communication to strengthen engagement on sustainability.**

Rather than introducing new certification schemes or requirements, the strategy strengthens alignment across existing initiatives, reduces fragmentation and supports a shared direction for continuous improvement throughout the juice value chain.



Turning the strategy into action

Since launching the strategy, AIJN has focused on turning it into practical tools and collaborative initiatives.

One early achievement was the publication of the **Guidance Document on Sustainability Definitions and Standards**, which establishes a common sustainability language for the sector. It brings together internationally recognised frameworks and existing standards for agricultural production and social compliance, helping companies navigate expectations and improve consistency across supply chains.

To support consistent external communication, AIJN has also developed a new **Sustainability Message House**. This framework helps companies, national associations and sector initiatives communicate about sustainability through aligned messages that reflect the sector's shared priorities.

The AIJN Sustainability Task Force is also developing the strategy's implementation roadmap. Building on the four pillars, the 2026 Action Plan focuses on four priority areas:

- **Sustainability standards;**
- **Carbon data and measurement tools;**
- **Regenerative agriculture;**
- **Stronger sustainability communication across the value chain.**

Through these workstreams, AIJN promotes collaboration, develops practical guidance, supports knowledge exchange and encourages joint initiatives that drive continuous improvement across the European fruit juice sector.

Strengthening sustainability data

A major new development under the strategy is the launch of the **AIJN Sustainability Data Expert Group**, supporting Pillar 2.

Running initially from July to December 2026, the Expert Group will bring together technical experts from member companies to improve the quality and availability of farm-level sustainability data.

Reliable primary data remain a major challenge for the sector. Many environmental assessments still rely on generic proxy datasets, which can be costly and may not accurately reflect agricultural practices. The Expert Group will assess existing datasets, identify overlaps and gaps, and develop recommendations to improve data quality on topics such as greenhouse gas emissions, biodiversity and water use.

This work will support future sustainability reporting and provide a stronger evidence base for the sector's environmental performance.

A collaborative strategy for the entire sector

The AIJN Sustainability Strategy is a living framework that evolves with the sector and its sustainability challenges. Its success depends on active participation across the value chain.

Companies can contribute by joining AIJN's Sustainability Committee, taking part in initiatives through the Sustainable Juice Platform (SJP) and Sustainable Juice Covenant (SJC), sharing the strategy and guidance documents internally and with supply chain partners, and encouraging discussion through national associations.

By aligning around common principles, sharing knowledge and working together, the European fruit juice sector is building a stronger foundation for sustainable sourcing, better data quality and more effective communication, supporting long-term resilience and measurable sustainability progress.

Companies and stakeholders interested in learning more about the AIJN Sustainability Strategy or contributing to its implementation are encouraged to get in touch with justine.pradels@aijn.eu



Advancing Sustainable Innovation in Mediterranean Food Value Chains

Eleni Marabouli, QA & Sustainability Manager, ASPIS SA. Greece

ASPIS Hellenic Juice Industry is participating in **EXCEL4MED**, a research and innovation project funded by the European Union, which aims to establish an **Excellence Hub in Mediterranean fruit supply chains** and accelerate the transition towards more *sustainable, resilient and innovative food systems*.

The project is bringing together partners from Greece, Malta and France, connects research institutions, industry, producers, policymakers and consumers with a common objective: to develop innovative solutions that can strengthen Mediterranean food value chains while creating greater value from agricultural resources and reducing waste.

For **ASPIS**, participation in **EXCEL4MED** is an opportunity to contribute industrial experience to a European ecosystem where **research, innovation, sustainability and practical application** come together.

Sustainability and Circular Food Economy

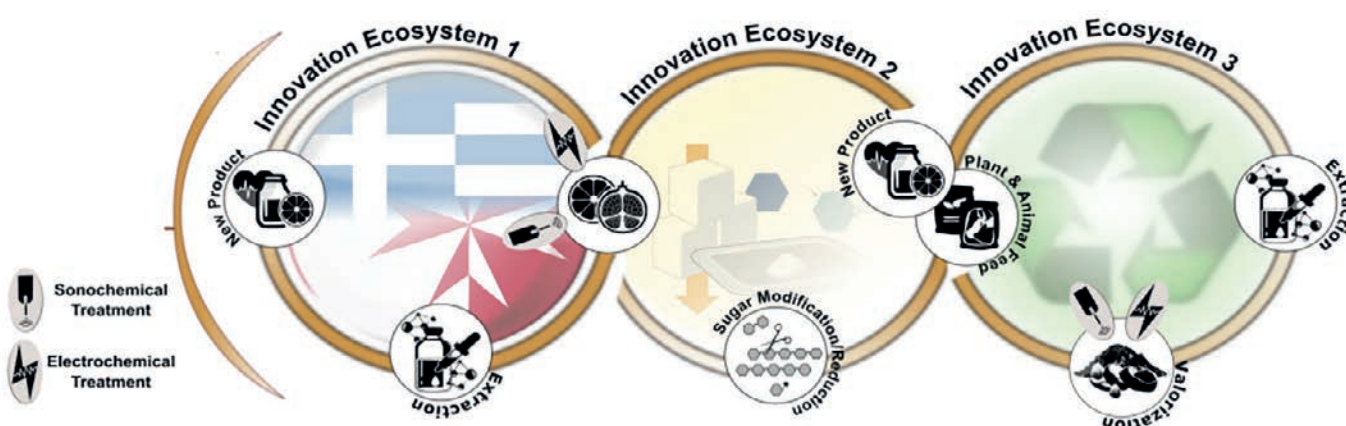
One of the strongest elements of **EXCEL4MED** is its focus on resource efficiency and circularity, structured around

THREE INNOVATION ECOSYSTEMS

Ecosystem 1: Green extraction process of pomegranate and citrus seed oil for improved fatty acid and bioactive profile

Ecosystem 2: Green technologies for juice sugar breakdown conversion

Ecosystem 3: Green valorization technologies of side-stream by-products and industrial effluents

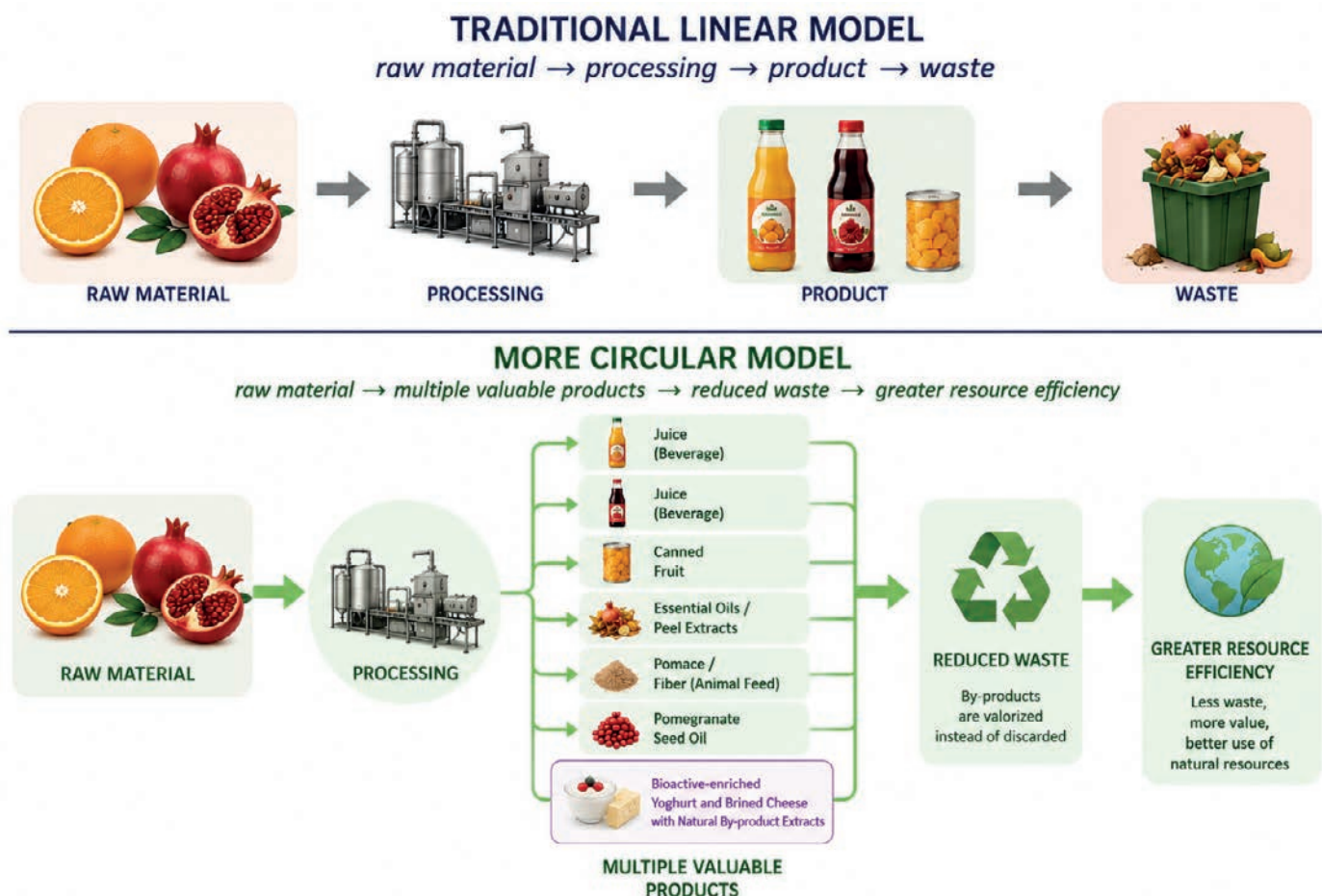


The project explores how fruit-processing by-products can be transformed from **low-value residual materials into valuable sources of bioactive compounds and other ingredients**.

The research includes the development of green extraction technologies for citrus and pomegranate, aimed at recovering valuable components while reducing the environ-

mental impact of conventional processing methods. The project includes the development of novel added-value food products, green extraction strategies and pilot-scale activities for citrus and pomegranate supply chains.

This approach supports a transition from the traditional linear model to a more circular model.



From Research to Real-World Application

EXCEL4MED places particular emphasis on translating research results into practical applications.

Through **Living Labs**, the project creates a collaborative environment where industry representatives, researchers, producers, policymakers and other stakeholders can come together to identify real challenges, exchange knowledge and co-create potential solutions. Living Labs are particularly valuable because they connect research and innovation with real-world needs, allowing ideas to be discussed, tested and shaped in collabora-

tion with the people and organizations who may ultimately use or implement them.

The first Living Lab in Greece, brought together farmers, researchers, policymakers and representatives of the Mediterranean fruit-processing industry to explore sustainable practices and innovative processing methods.

A second Greek Living Lab focused on pomegranate and citrus value chains and providing a platform for stakeholders to work together on innovative solutions applicable to real-world food supply chains.

Corresponding Living Lab activities were also subsequently organized in Malta, further strengthening the project's cross-Mediterranean approach and exchange of knowledge between stakeholders.

Research and Scientific Publications

The scientific work generated through EXCEL4MED is already contributing to the wider body of knowledge on sustainable food processing and food-waste valorization.

Among the project's scientific publications are studies on **hydrodynamic cavitation for citrus waste valorisation**, exploring applications ranging from beverage enhancement to water remediation.

Another publication investigates **non-thermal ultrasonic-assisted extraction of bioactive compounds from citrus peel waste**, while further research examines the potential of hydrodynamic cavitation in food processing and its antimicrobial applications.

Research presented through EXCEL4MED has also explored sustainable extraction from **pomegranate seed oil**, including the optimization of ultrasound-assisted extraction processes aimed at improving oil yield while preserving valuable phenolic compounds.

These scientific activities demonstrate the project's central philosophy: **innovation should not only create new products but also improve the way resources are used and create value from materials that have traditionally been underutilized.**

“As a company operating in the fruit and juice-processing sector, ASPIS provides a direct connection to the realities of industrial production.”

Knowledge Sharing and Public Engagement

An important component of EXCEL4MED is the dissemination and sharing of knowledge.

The project has developed public deliverables covering areas such as consumer acceptance, innovation bottlenecks, co-creation workshops, Living Labs, green extraction processes and communication activities.

Its communication activities also extend beyond the scientific community. EXCEL4MED has organized workshops, educational activities, consumer engagement events, conferences, trade-show activities and public demonstrations.

“An important component of EXCEL4MED is the dissemination and sharing of knowledge.”

The project's recent activities have included participation in several food exhibitions, where EXCEL4MED presented its work on high-nutritional-value products and sustainable practices, where the project highlighted the importance of food-waste reduction, resource efficiency and climate-resilient food systems.

The project has also actively engaged students and the wider public in discussions around food waste, sustainability, circular economy and responsible resource use, demonstrating that sustainable transformation requires not only technological innovation but also awareness and participation across society.

ASPIS: Connecting European Research with Industry

ASPIS's role in EXCEL4MED reflects the importance of bringing industrial experience into European research and innovation projects.

As a company operating in the fruit and juice-processing sector, ASPIS provides a direct connection to the realities of industrial production. This perspective is valuable when evaluating whether emerging technologies and innovative concepts can move from the laboratory towards practical implementation.

“ASPIS is contributing to this collaborative effort and supporting the development of solutions that can help make Mediterranean food value chains more innovative, circular, resource-efficient and resilient.”

ASPIS has also contributed to the project’s stakeholder engagement activities. In May 2024, the company hosted an **EXCEL4MED** workshop in **Argos, Greece**, focusing on good practices in citrus cultivation and consumer perceptions of innovative citrus-based products.

Such activities create opportunities for knowledge exchange between **producers, researchers, industry, agronomists and consumers**, helping to identify both the challenges and the opportunities associated with the future of Mediterranean fruit value chains.

Sustainability as a Long-Term Commitment

For **ASPIS**, sustainability is closely connected with the responsible use of resources, innovation and long-term value creation.

Participation in **EXCEL4MED** provides an opportunity to further integrated these principles across the food value chain, from agricultural production and raw-material utilization to processing, product development and by-product valorization.

As climate change and resource constraints increasingly affect food production, the ability to produce more value from existing resources will become increasingly important.



All information about **EXCEL4MED**, including project news, articles, scientific publications and public deliverables, is available through the project’s official communication channels and website. Those interested in following the project’s progress and future activities can also follow its social media pages for updates and announcements.

Looking Ahead

EXCEL4MED demonstrates that sustainable transformation cannot be achieved by one organization or one sector alone.

It requires collaboration between research and industry, producers and consumers, technology developers and policymakers.

Through its participation in **EXCEL4MED**, **ASPIS** is contributing to this collaborative effort and supporting the development of solutions that can help make Mediterranean food value chains more **innovative, circular, resource-efficient and resilient**.

The project’s scientific publications, Living Labs, pilot activities, training programs and public engagement initiatives are all part of the same broader vision: transforming knowledge into practical solutions and creating new value from the resources already available within the Mediterranean food system.

For ASPIS, innovation and sustainability are not separate objectives. They are complementary elements of a more responsible and resilient future for the food industry.



Website: www.excel4med.eu



**Funded by
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People make the difference: The case for sustainable leadership in the juice industry

Dörte Thiel, Leadership Development Consultant. Germany

Most transformations succeed or fail based on how people are led.

The plan is often solid. The intention is genuine. But somewhere between the boardroom and the shop floor, something gets lost. People disengage. Accountability blurs. And the gap between what was intended and what actually happens quietly widens. This dynamic exists across industries. In the juice industry, where the margin for error is slim and the pressure is constant, it carries a particularly higher price.

An industry that never stands still

Few industries operate under as much sustained pressure as fruit processing. Raw material prices fluctuate with harvests, weather patterns, and geopolitical shifts that outpace any planning tool. Availability windows are tight. Seasonal peaks compress enormous operational complexity into short time frames: harvest campaigns, processing runs, the race to meet demand before the window closes. And all of this unfolds while the industry simultaneously navigates rising consumer expectations around transparency, health, and environmental responsibility.

This situation demands organisations that adapt quickly, communicate clearly under pressure, and make sound decisions when conditions are anything but stable. Technology supports that capacity. People enable it. And what determines whether people perform at their best, consistently and across seasons, is the quality of leadership around them.

The cost of disengagement

Here is the number that should stop every leader in their tracks: only 20% of employees worldwide are genuinely engaged in their work. That means in average four out of five people in your organisation are showing up, do-

ing what is required, and leaving a significant part of their capability at the door. According to Gallup's State of the Global Workplace 2026 report, the cost of that disengagement amounts to \$10 trillion in lost productivity every year, which is roughly 9% of global GDP. Not a rounding error. The entire economic output of i.e. Germany, France, and the United Kingdom combined, evaporating annually because people are not led well enough to care.

And the single biggest driver of that disengagement? Gallup's research is unambiguous: 70% of the variance in team engagement is determined by the direct manager. Not strategy. Not compensation. Not the economic environment. The manager.

70% of the variance in team engagement is determined by the direct manager.

These numbers apply across sectors. In the juice industry, they translate into very specific operational consequences.

A team member going through the motions overlooks the early signs of a quality issue. A supervisor who feels undervalued stays within the minimum when something breaks down late at night. A middle manager who has always been handed instructions rather than trusted with decisions waits for someone above them to act, even when the situation calls for immediate judgement. And when those people eventually leave as they do, the cost of replacing them runs between 50% and 200% of their annual salary, according to research from SHRM and analyst Josh Bersin. Recruitment, onboarding, the productivity loss during the transition, and the institutional knowledge that walks out the door with them. In an industry where experienced operators and quality managers are hard to find and harder to replace, that is a number worth sitting with.

One in two employees left a job specifically to get away from a manager, according to Gallup Institute. BambooHR's 2025 research puts it even more drastic: 90% of employees do not quit jobs. They quit incompetent leaders. And 42% of those who left voluntarily say their organisation could have done something to prevent it.

To make that tangible: take a mid-sized juice company with 200 employees. Based on Gallup's global engagement data, roughly 40 of those people are genuinely engaged. The remaining 160 range from quietly disengaged to actively checked out. Applying conservative productivity loss estimates - 18% of salary for the disengaged, 34% for the actively disengaged - that translates to over €1.5 million in lost productivity annually. Add a 15% annual turnover rate (30 people leaving each year) at a conservative replacement cost of 75% of salary, and the total climbs to approximately €2.5 million per year. Every year. Silently. Showing up nowhere in the P&L, but felt in every missed deadline, every quality issue, every customer interaction that was just good enough rather than genuinely good.

Multiply that across an organisation, and the real cost becomes visible. Lost revenue is only part of it. The deeper loss is in missed opportunities, avoidable waste, and the gradual weakening of a culture where people genuinely care about the outcome. In an industry where

margins are tight and timing is everything, that weakening is a business problem, full stop.

What sustainable leadership means in practice

Sustainable leadership is a set of practices that can be learned, applied, and refined over time. In an industry as demanding as fruit juice, these practices have very concrete effects.

When leaders communicate direction rather than just tasks, people understand both what to do and why it matters. That understanding is what allows teams to adapt intelligently when conditions shift, to make good calls when a frost, a failed harvest, or a sudden change in raw material availability upends the production plan. Teams with that clarity act with confidence. Teams without it wait for instructions that may arrive too late.

When contribution is made visible, people bring more of themselves to their work. Recognition is a leadership tool with measurable impact on retention, motivation, and the willingness to go beyond the minimum. In industries with high seasonal workloads and significant physical demands, this matters directly. The difference between a team that feels seen and one that feels interchangeable shows up in turnover rates, in the quality of work during peak periods, and in whether expe-



rienced people stay and grow or take their knowledge elsewhere.

When psychological safety is present, problems surface early. The confidence that speaking up leads to solutions rather than blame is what allows people to flag an issue before it escalates into a crisis. In a production environment, that early warning is worth more than any corrective measure applied after the fact. This kind of culture is built through consistent leadership behaviour, in small decisions and large ones, day after day.

When responsibility is genuinely delegated, capability grows across the organisation. Trusting someone with a decision is fundamentally different from assigning them a task. Leaders who extend that trust over time build teams that are resilient and self-directing, ready to act well even when the leader is unavailable. In an industry where key decisions often need to be made quickly and locally, that distributed capability is a real operational advantage.

When leaders are consistent, the organisation learns what is actually valued. Credibility is built through the alignment between what is said and what is decided. Every time a long-term commitment holds under short-term pressure, that signal is registered. Every time it yields, that signal is registered too. Over hundreds of small decisions, culture is shaped far more by those signals than by any values statement.

Why this industry, and why now

The juice industry has a particular relationship with time. Seasons set the rhythm. Harvests define the window. Every person in the chain needs to be ready, capable, and genuinely committed when that window opens, and that readiness is built long before the season begins.

It is built through the quality of leadership that people experience every single day: in how their questions are answered, how their ideas are received, how they are treated when things go wrong, and how much they feel they belong to something worth contributing to. Organisations that invest in this steadily, as a genuine part of how they operate rather than a periodic initiative, hold their best people, attract new talent, and move through volatility with confidence.

The industry is also at a moment of significant transition. Environmental commitments are becoming more con-

crete. Supply chains are under observation. Consumer expectations are shifting in ways that require genuine organisational change. All of that demands engaged, capable people who are willing to move. The human foundation needs to be strong enough to carry that weight.

The dimension that belongs in the conversation

Sustainability in this industry is rightly understood as a question of environmental responsibility, supply chain integrity, and long-term resource stewardship. The progress being made across the sector is real and significant.

The human dimension belongs in that conversation with equal weight. Carbon targets need people who understand them and act on them. Quality standards need teams that take genuine ownership. Innovation needs cultures where people feel secure enough to challenge the way things have always been done.

Leadership quality is the condition that makes all of it possible. Organisations that treat it with the same focus they bring to process improvement or sustainability reporting are the ones best positioned for what this industry demands next.

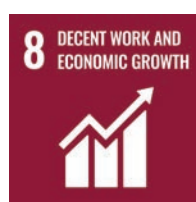
That is already visible in the organisations navigating complexity with confidence, holding their people, and delivering on their commitments. The common factor is rarely the technology. It is how people are led.

Dörte Thiel works with leadership teams in the food and beverage industry, with a particular focus on building the leadership skills and culture that enables sustainable business performance.

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References:

Gallup, State of the Global Workplace 2026
Gallup, State of the Global Workplace 2024
Gallup, "Managers Account for 70% of Variance in Employee Engagement"
Google, Project Aristotle (re:Work)
McKinsey, Global Survey on Performance Management 2024
SHRM / Josh Bersin, employee replacement cost research
BambooHR, The Boss Effect 2025



PPWR – An overview of the European Union's Packaging and Packaging Waste Regulation and their implications for the juice industry

Tânia Dias da Costa (Project Manager) and Peter Désilets (Director),
pacoon Sustainability Concepts GmbH

The PPWR (Packaging and Packaging Waste Regulation) took effect on August 12, 2026, and applies to all packaging placed on the market in the European Union and to all packaging waste, regardless of the type of packaging or the material used.

Companies based in the EU and those that export their packaged products or packaging to the EU are significantly impacted, as the PPWR requires structural changes to their packaging and logistics processes, including packaging for transportation and B2B trade.

The PPWR aims to drastically reduce packaging waste across Europe, with a focus on increasing recycling rates, making packaging in the EU reusable or economically viable to recycle by 2030. It is expected to reduce the environmental impact of packaging and packaging waste and promote the circular economy.



For companies, the following six issues represent challenges to be addressed:

1. Recyclability of packaging under real-world conditions considering existing recycling infrastructure. In this regard, companies also depend on the actions of Member States. This target applies to both single-use and reusable packaging.
2. Use of recycled material in plastic packaging, including packaging that comes into contact with food. The PPWR sets a target that, by 2030, at least 55% of all plastic packaging be recycled. This is complemented by mandatory requirements regarding the use of recycled materials in new packaging. These obligations particularly affect sectors such as food and beverages, which, due to strict hygiene standards, have until now relied predominantly on virgin plastics for their packaging or PET. The implementation of these targets is therefore considered a major challenge, requiring a shift across the entire value chain. Today, a GAP of approx. 3 mio tons of recycled plastic has been identified by market players for all kinds of plastic.
3. Deposit-return systems for single-use packaging in the beverage sector and the HoReCa segment (hotels, restaurants, and food service) as well as reuse systems for transport and e-commerce packaging and sales packaging are challenging targets. Shipping packaging circulating in reuse systems is potentially exposed to high hygiene risks, often resulting from inadequate cleaning infrastructure. This



poses significant risks not only to food supply chains but also to sectors such as the pharmaceutical and chemical industries. Here, not only packaging types have to be developed or optimized, the entire system has to be created in order to allow perfect conditions for refill and avoid trade mark risk by recalls.

4. Minimization of materials for all packaging and reduction of empty space in shipping and e-commerce packaging. The PPWR addresses wasted space and requires the physical weight of packaging to be minimized to the strict functional limit. Double walls, over-packing and unnecessary packaging are in focus of the PPWR. The most relevant packaging will be identified by the countries' committees and limits will be set.
5. Establishment of maximum limits for substances of concern: requirements to be met since August 2026, covering PFAS in food-contact packaging, as well as lead, cadmium, mercury, and hexavalent chromium in all types of packaging. Brand owners will therefore have to investigate the packaging specifications with the suppliers and later on need to do laboratory analyses to find our existence and concentration of such substances.
6. Labeling and reporting requirements: the manufacturer (responsible for the Declaration of Conformity, DoC) will have to be mentioned together with the packaging ID on the packaging itself and in traceability processes, as well as the provision of information and compliance reports prior to placing the packaging on the market.

Packaging that, within each phase defined in the PPWR, does not comply with the regulation's guidelines will quickly disappear from store shelves and may result in penalties and product recalls. Although 12 of August 2026 has been passed already, the EU commission has granted an extra 6 months period to fulfill the requirements for the DoC as many companies around the world were not aware of the new regulation.

Impacts of the PPWR on the juice industry:

The PPWR has profound and immediate impact on the global juice industry, as the European Union (EU) is one of the world's largest import markets for fruit juices, generating billions of euros annually to meet its domestic demand.

The impacts affect not only companies that sell juices in final consumer packaging but also those selling products like ingredients, concentrate or aromas in bulk or in drums, for example, those exported to or transported within the European Union. Among the main impacts, we highlight:

- Immediate requirement for documentation and compliance with limits on substances of concern: Starting in August 2026, companies should have provided a detailed Declaration of Conformity, with transparent data and technical documentation covering the entire packaging supply chain (from PET bottles, caps, and labels to cardboard boxes, plastic shipping films, drums, and other items).
- Mandatory, phased-in recyclability: Starting in 2030, a most all packaging sold in the EU must be economical-



ly recyclable. Some packaging is exempt, but under certain situations only. In these cases, there is a major challenge for multilayer carton packaging (“long-life”) or complex labels, which will require extensive design revisions (Design for Recycling) to ensure that material separation technologies in Europe can process them efficiently and without loss of quality. Juices in drums often use plastic or aluminized inner liners (liners or aseptic pouches). If these multilayer films cannot be efficiently separated or recycled (achieving at least 70% recyclability in 2030, 80 % from 2038), they will be banned starting in 2030.

- Post-Consumer Recycled (PCR) Content Targets: For the beverage and juice sector that uses plastic packaging (such as PET bottles), the PPWR imposes mandatory minimum quotas for post-consumer recycled (PCR) plastic in new packaging, which may trigger a rush for food-grade recycled PET. The industry will need to ensure a supply of certified and traceable recycled resin. This requirement applies to almost all plastic packaging, including transport packaging in different quotas depending on their use of basic material.
- Transportation Logistics and Waste Minimization: The impact is not limited to the packaging that reaches the end consumer but encompasses all transportation packaging (boxes, stretch film, straps, drums, IBCs, etc.). In this case, the impact lies in logistics, circularity, and material composition.
- Deposit and Return Systems: Beverage packaging, such as juice bottles, will be subject to the return system and, therefore, must have appropriate labeling to provide information to consumers, in addition to

registration with recycling management organizations in Europe and the payment of environmental fees proportional to the volume of packaging placed on the market (Extended Producer Responsibility).

The PPWR poses a major challenge for companies, but it also presents a significant opportunity to drive innovation in materials, processes, and technologies. Collaboration on new developments and compliance processes is key to business success in the European Union.

pacoon Sustainability Concepts is a German consulting firm specializing in regulatory matters related to packaging and the development of sustainable packaging concepts and designs.

We are deeply involved in PPWR-related work; we have developed a Packaging Guide and conduct workshops and training sessions on the topic, tailored to companies' needs. In addition, we have developed two web-based tools: the PPWR Conformity Hub®, for the automated generation and management of Declarations of Conformity, and the PPWR Check®, which enables the verification of packaging compliance starting in 2030, considering the requirements to be applied at each implementation phase. Consulting services to support the PPWR and other packaging regulations are also available as well as experts in screening or developing future proof packaging.

Contact email: ppwr@pacocon.de



From Farm to Factory: Practical Sustainability in Australia's Juice Industry



Shannon Doherty-Andall, Sustainability Manager.
Australian Beverages Council

Australia's juice industry is shaped by businesses operating across diverse regions, supply chains and production scales. For small and medium-sized manufacturers in particular, sustainability is often closely connected to operational efficiency, resilience and the long-term strength of local communities and agricultural supply chains.

The initiatives highlighted in this article demonstrate how practical sustainability action can be embedded throughout a business. From renewable energy, water reuse and improved packaging to reducing food loss and working collaboratively with growers, these businesses are finding solutions that respond to their local circumstances while contributing to broader industry goals.

Eastcoast Beverages and Tropicana Fruits provide two distinct examples of Australian businesses using collaboration, investment and continual improvement to reduce environmental impacts, strengthen regional supply chains and maximise the value of locally grown fruit.



Eastcoast Beverages **Kulnura, New South Wales**

Since 2017, Eastcoast Beverages has embedded sustainability into their business through their Return, Regrow, Re-Juice framework, guiding environmental, social and operational improvements across the company.

Their initiatives include transitioning to 100% recyclable bottles, removing unnecessary plastic from labels, expanding their solar installation, introducing electric forklifts and EV charging infrastructure, upgrading to energy-efficient lighting, air compressors and heat pump hot water systems, and implementing water-saving initiatives including production water reuse for irrigation.

Eastcoast is committed to reducing waste throughout their operations. Fruit peel generated during juice production is diverted from landfill and supplied to local farmers as cattle feed, while comprehensive recycling





systems continue to expand across manufacturing sites. They have also joined the Australian Beverages Council's ESR30 program and the Australian Packaging Covenant Organisation (APCO) to support continual improvement in emissions reduction and sustainable packaging.

For Eastcoast, supporting Australian communities is equally important. Over recent years, Eastcoast has donated significant quantities of juice and water to charities and community organisations.

Looking ahead, they continue to invest in projects including increased recycled content in packaging, Australian-first sourcing initiatives, improved recycling systems and further reductions in their operational carbon footprint.

At Eastcoast Beverages, sustainability is not a standalone project, it is an ongoing commitment that influences how they source, manufacture, package and give back to local communities.



Tropico Fruits
Yandina, Queensland

Tropico believes the best sustainability outcomes are achieved through collaboration. This includes working closely with growers and long-standing supplier partners such as Tropical Pines,



who take a proactive approach to managing the pineapple crop from planting through to harvest.

Tropical Pines' direct work with Australian farmers on planting intentions, harvest schedules and accurate forecasting is making a real difference for growers. Their team works closely with pineapple growers to anticipate seasonal supply, respond to market demand and make informed decisions that maximise the value of each crop. Through regular communication and forecasting, growers gain greater confidence, while the fresh and processing markets can plan more effectively throughout the year. This also helps supermarkets and manufacturing partners like Tropic Fruits understand when fruit will be available in abundance and when supply may ease, allowing them to plan production schedules and keep customers informed.

Natural flowering events, challenging weather conditions, and periods of reduced fruit quality can significantly impact production. During these times, Tropical Pines and Tropic Fruits work hand in hand with growers to assess crop volumes, fruit quality, and harvest timing, ensuring fruit is directed to its highest-value market. Fresh market fruit is prioritised where specifications can be met, while suitable fruit is diverted to processing such as juice, reducing waste and minimising fruit left in the field.

This collaborative approach not only helps growers recover value from fruit that may otherwise be lost due to weather events, quality issues, or natural flowering flushes, but also supports sustainable farming practices by reducing waste and making the best possible use of every pineapple grown.

Together, Tropical Pines, pineapple growers and Tropic Fruits form an integrated supply chain that strengthens the Australian pineapple industry, improves grower returns, reduces waste, and ensures consumers can enjoy quality Australian pineapples year-round while maximising the value of every harvest.

“Together, Tropical Pines, pineapple growers and Tropic Fruits form an integrated supply chain that strengthens the Australian pineapple industry...”



From Orchard to Glass:

IFU at COP30

Tatiana Campos, Executive Director,
International Fruit and Vegetable Juice Association (IFU)

COP30 placed implementation, adaptation and finance at the centre of global climate discussions. For IFU, it also created an important opportunity: to show that processing is not peripheral to sustainable food systems, but one of the essential links connecting farms, consumers, nutrition and resilience.

A first for IFU - and an important signal

In November 2025, IFU participated in COP30 in Belém, Brazil, represented by our Executive Director, Tatiana Campos. It was the first time our association formally participated in a United Nations Climate Change Conference, and it marked a significant step in ensuring that the fruit and vegetable juice sector is represented in global conversations about climate action and food-systems transformation.

COP30 took place against a demanding backdrop. The previous year had been confirmed as the warmest on record, at around 1.55°C above pre-industrial levels, while the collective ambition of countries' latest climate plans remained insufficient. The conference's adopted package sought to accelerate implementation of the Paris Agreement, scale climate finance, advance adaptation and strengthen support for developing countries. It also exposed continuing political divisions, particularly because the final agreement did not contain an explicit new commitment on transitioning away from fossil fuels. For IFU, however, the most immediate question was practical: where does our sector fit in the transition to food systems that are lower-emission, more resilient, more nutritious and better able to use scarce resources? Belém gave us the right forum in which to answer that question.

Bringing the 'hidden middle' into view

At the invitation of the United Nations Industrial Development Organization (UNIDO), we joined a closed-door high-level roundtable on 13 November at the Action on Food Hub in the Blue Zone, represented by Tatiana Campos. The session, "Building a Coalition for the Hidden Middle of Food Value Chains," brought together UNIDO, FAO, the UN Food Systems Coordination Hub, the Brazilian Ministry of Foreign Affairs, Tetra Pak, Food



Nation, the World Packaging Organisation, GAIN, the OPEC Fund, Boston Consulting Group, WBCSD and representatives of other food sectors.

The ‘hidden middle’ describes the processing, packaging, storage, transport and distribution activities between farms and consumers. These activities can be less visible in public debate than primary agriculture or retail consumption, yet they are indispensable. The round-table materials highlighted that this part of the value chain accounts for an estimated 22% of food-related emissions and may generate 40-60% of the economic value within food systems.



This is precisely where much of the juice sector operates. Our members connect agricultural production with safe, stable and internationally traded foods. They manage highly perishable raw materials, develop processing and preservation technologies, recover value from by-products, protect quality and authenticity, and move products through complex global supply chains.

“Processing is not a gap between the farm and the consumer. It is where perishability can become availability, where by-products can become value, and where science can become trust.”
– Tatiana Campos

The contribution of the juice sector

During the discussion, we positioned IFU as a knowledge partner and emphasized four areas in which our sector already contributes to climate-resilient and sustainable food systems.

Reducing food loss and waste. Fruits and vegetables are among the most perishable agricultural products. Processing them into juices, purées and related products

can extend usability, preserve nutritional value and create markets for crops that might otherwise be lost after harvest. Many processors are also developing higher-value

uses for peels, seeds, fibres, oils and other co-products, moving closer to full use of the fruit or vegetable.

Protecting food safety. IFU’s internationally recognized methods of analysis, guidelines and technical best practices support the safety and quality of fruit- and vegetable-based products across markets.

Building trust through science and standards. Harmonized methods and credible scientific expertise help regulators, producers and customers speak a common technical language. They also support authenticity, regulatory consistency and international trade - all essential for resilient supply chains.

Supporting nutrition and access. Fruit and vegetable juices are foods that provide vitamins, minerals and plant-derived nutrients. Within appropriate dietary guidance, they can help broaden access to fruit and vegetable nutrition, particularly where seasonality, infrastructure or affordability limit the availability of fresh produce.

What Belém delivered - and what remains unfinished COP30 concluded with a broad set of decisions focused



on implementation. The package called for mobilizing at least USD 1.3 trillion annually by 2035 for climate action, included a goal of tripling adaptation finance by 2035, advanced arrangements related to loss and damage, and launched the Global Implementation Accelerator and the Belém Mission to 1.5°C. Parties also adopted a new Gender Action Plan, operationalized a Technology Implementation Programme and agreed to develop a just transition mechanism.

At the same time, the conference demonstrated how difficult consensus remains. The final decision did not include the explicit fossil-fuel language sought by more than 80 countries, nor agreed language on halting and reversing deforestation. The Brazilian COP30 Presidency subsequently announced work on two roadmaps – one addressing the transition away from fossil fuels in a just, orderly and equitable manner, and another on halting and reversing deforestation – with progress to be carried forward toward COP31.

Looking ahead

IFU's involvement gives our members a channel through which the sector's experience can inform this emerging agenda. It also strengthens our dialogue with international organizations. Following COP30, IFU has been exploring deeper cooperation with UNIDO in areas such as capacity building, food safety, processing technologies and sustainable juice value chains in developing countries.

“The Brazilian COP30 Presidency subsequently announced work on two roadmaps – one addressing the transition away from fossil fuels in a just, orderly and equitable manner, and another on halting and reversing deforestation”

COP31 AT A GLANCE OFFICIAL INFORMATION

DATES: 9-20 November 2026

HOST CITY: Antalya, Türkiye

VENUE: Antalya EXPO Center, Aksu, Antalya

FORMAL SESSIONS: COP31, CMP21 and CMA8, meeting alongside the 65th sessions of the UNFCCC subsidiary bodies.

PRESIDENCY ARRANGEMENT: Türkiye and Australia will work in partnership as the incoming COP31 Presidency under the agreed partnership modalities.

PARTICIPATION: Registration and participation follow UNFCCC procedures for Parties, observer States, UN organizations, admitted IGOs and NGOs, and accredited media. Official information is updated through the UNFCCC COP31 pages.

OFFICIAL SOURCE: [UNFCCC COP31 CONFERENCE PAGE AND INFORMATION FOR PARTICIPANTS](#)



Partnering for Sustainable Food Systems: How the Global Flagship Initiative for Food Security Advances the Sustainable Development Goals



Dr. Conrad Rein, Secretary General of the Global Flagship Initiative for Food Security

Food security is one of the defining challenges of our time. Around the world, conflict, climate change, biodiversity loss, land degradation, water scarcity and economic shocks continue to undermine agricultural production and livelihoods. At the same time, global food systems must feed a growing population while becoming more resilient, sustainable and inclusive.

No single government, organisation or company can solve these challenges alone. Achieving the Sustainable Development Goals (SDGs) requires partnerships that bring together public and private actors, development finance institutions, research organisations and civil society to translate commitments into concrete action.

This is precisely the vision behind the Global Flagship Initiative for Food Security.

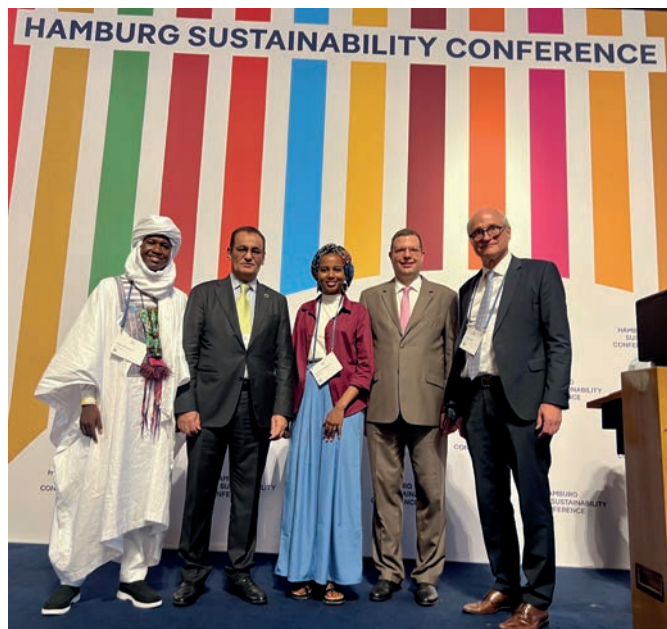
Launched during UNCCD COP16 in Riyadh in December 2024, the Global Flagship Initiative for Food Security has rapidly grown into a global coalition of almost 140 members from governments, United Nations organisations, development finance institutions, regional organisations, research institutions, the private sector and civil society. Its objective is to mobilise partnerships, investment and scientific expertise to accelerate the implementation of resilient, sustainable and investment-ready food security solutions.

For industries that depend on resilient agricultural supply chains, including the fruit and vegetable juice sector,

food security is not only a development challenge – it is fundamental to long-term business resilience. Sustainable sourcing, climate adaptation, healthy soils, water stewardship and thriving farming communities are essential for securing future production and markets.

Today, the Initiative continues to expand its global coalition. Recent new members – including the United Nations Industrial Development Organization (UNIDO), Enabel – the Belgian Agency for International Cooperation, and the COMESA Business Council – reflect the growing recognition that food security depends on stronger collaboration across sectors. These partnerships strengthen cooperation on agro-industrial development, resilient value chains, investment mobilisation, regional trade and private sector engagement.





Delivering the Sustainable Development Goals

The Initiative contributes directly to several Sustainable Development Goals. Its primary contribution is naturally SDG 2 (Zero Hunger) by promoting resilient food systems, improving agricultural productivity and strengthening food security. However, its work extends well beyond agriculture.

By promoting sustainable value chains, responsible production, agro-industrial development and improved market access, the Initiative contributes to SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure) and SDG 12 (Responsible Consumption and Production). At the same time, its work on climate resilience, sustainable land management, biodiversity conservation and drought resilience advances SDG 13 (Climate Action) and SDG 15 (Life on Land).

Perhaps most importantly, the Initiative embodies SDG 17 (Partnerships for the Goals) by creating a platform where governments, international organisations, financial institutions, scientists and businesses work together to deliver measurable impact.

Why the Private Sector Matters

The private sector is not simply a stakeholder in food security – it is one of its principal drivers.

The Global Flagship Initiative seeks to reduce fragmentation by connecting governments, development finance institutions, investors and businesses around shared implementation priorities. In doing so, it creates an enabling environment where public policies, development finance and private investment reinforce one another, reduce investment risks, strengthen local ownership and create opportunities for sustainable growth.

Businesses drive investment, innovation, technology transfer, processing, logistics, market access and employment across agricultural value chains. From farmers and cooperatives to food processors, traders and retailers, the private sector plays a central role in transforming food systems into engines of sustainable economic growth.

The fruit and vegetable juice sector provides an excellent example. Sustainable sourcing, resilient supply chains, support for smallholder farmers, water stewardship and climate-smart production all contribute directly to stronger food systems and more resilient rural economies.

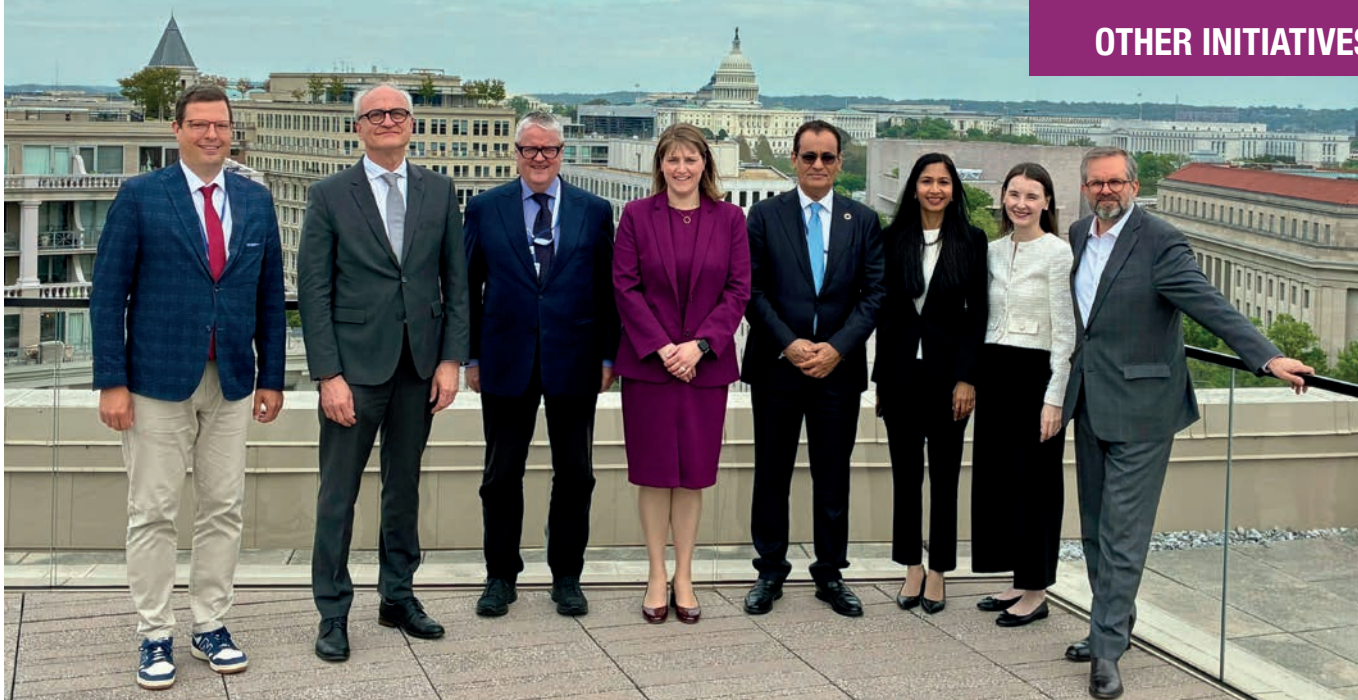
For fruit and vegetable producers and processors, investing in resilient supply chains, healthy soils, water stewardship and sustainable sourcing is not only good environmental practice – it is essential for ensuring long-term competitiveness and security of supply.

From Dialogue to Implementation

A defining characteristic of the Initiative is its focus on implementation.

Recent engagements with development finance institutions, the European Union, Arab Coordination Group institutions and international partners have focused on translating political commitments into investment-ready programmes and scalable implementation. Discussions





have ranged from strengthening agricultural recovery in Syria to supporting food security and climate resilience across Africa, including the IGAD region.

This approach is already being translated into action through country-led implementation models. In Cameroon, for example, governments, development partners, scientific institutions and financial organisations are working together to strengthen resilient agricultural value chains and improve the livelihoods of smallholder farmers through blended finance and locally owned implementation.

Investing in the Next Generation

Young people will shape the future of global food systems.

Recognising this, the Global Flagship Initiative recently convened a global Youth Consultation in preparation for UNCCD COP17. Young leaders from across the world developed a shared set of recommendations calling for greater investment in youth-led solutions, improved access to finance and technology, stronger participation in decision-making and increased support for locally led innovation. These priorities closely align with the need to build the next generation of entrepreneurs, producers and innovators across sustainable agricultural value chains.

These recommendations will help inform the Initiative's future work while ensuring that youth remain active partners in building resilient food systems and climate resilience.

Looking Ahead

As preparations continue for UNCCD COP17 and the Initiative's Annual Members Meeting during the 81st Session of the United Nations General Assembly, the Global Flagship Initiative for Food Security continues to expand its partnerships and implementation activities.

The challenges facing global food systems are immense – but so are the opportunities. By bringing together governments, businesses, financial institutions, scientists and civil society, the Initiative demonstrates that sustainable food security is not only a development objective but also an investment in resilience, prosperity and long-term stability.

The International Fruit and Vegetable Juice Association and its members are well positioned to contribute to this global effort. Through sustainable sourcing, innovation, responsible investment and partnerships with farmers, governments and international organisations, the fruit juice sector can help build resilient agricultural value chains while advancing multiple Sustainable Development Goals.

The Global Flagship Initiative for Food Security looks forward to working with IFU and its members to build partnerships that transform food systems into engines of resilience, sustainable growth and shared prosperity.



CITRUSBUSTERS: transforming citrus by-products into natural plant protection solutions

Miguel Angel Torres (Associate Professor) and Meriem Aitouguinane (Postdoctoral researcher), Plant Biotechnology and Genomics Center (CBGP)/Universidad Politécnica de Madrid (UPM)

Protecting Citrus Crops through Innovation and Circular Economy

CITRUSBUSTERS is a European collaborative project that aims to develop sustainable strategies to protect citrus crops against two of the most devastating citrus diseases worldwide: Huanglongbing (HLB, also known as citrus greening disease) and Citrus Black Spot (CBS). These diseases threaten citrus production, fruit quality, grower profitability, and the long-term sustainability of the citrus industry.

CITRUSBUSTERS adopts a multifaceted approach that combines early detection and surveillance technologies, the identification of resistant or tolerant citrus genotypes, the development of biocontrol solutions, plant immunity activation strategies, and the validation of innovative tools under greenhouse and field conditions. One of the key objectives is to develop innovative prevention tools that reduce dependence on conventional pesticides while promoting sustainable and environmentally friendly crop protection solutions.

From Citrus Waste to Valuable Resources

The citrus juice industry generates large quantities of by-products, particularly peels, which are often underutilized despite being rich in valuable compounds. Within CITRUSBUSTERS, our group from Plant Biotechnology and Genomics Center (CBGP) from the Universidad Politécnica de Madrid (UPM) is exploring how these residues can be transformed into high-value products capable of enhancing plant immunity.

Citrus peels contain large amounts of cell wall components, especially pectins and other complex polysac-

charides. In nature, plants are able to detect fragments of their own cell walls when damage occurs. These fragments act as alert signals, known as Damage-Associated Molecular Patterns (DAMPs), which activate the plant immune system and prepare the plant to defend itself against pathogens.

Obtaining Immunity-Activating Biofractions

Our work focuses on extracting and processing citrus peel by-products using environmentally friendly technologies, to generate cell wall-derived molecules capable of acting as natural immunity activators, thereby helping plants to better resist future pathogen attacks. Through aqueous extraction and controlled enzymatic treatments, we generate biofractions enriched in cell wall-derived DAMPs. These biofractions are then evaluated in the laboratory to determine their ability to activate plant immune responses. Using model plants such as *Arabidopsis thaliana* and tomato, we assess early defense reactions and their capacity to enhance resistance against disease-causing microorganisms.

The results obtained so far are encouraging. Several biofractions derived from orange and mandarin peels have shown the ability to activate plant immunity and increase resistance to bacterial pathogens such as *Pseudomonas syringae*, a widely used model pathogen in plant pathology studies. Plants treated with some of these biofractions display reduced bacterial growth compared with untreated plants, indicating that the extracts can effectively stimulate natural defense mechanisms.

Towards Citrus Protection

The next step is to evaluate the most promising bio-

rations in citrus plants. The concept is similar to a plant “vaccination”: citrus plantlets will first be treated with the selected biofractions to activate their defenses and subsequently challenged with the target diseases. If successful, these studies will demonstrate that citrus-derived by-products can be transformed into natural protection agents capable of increasing crop resilience. The most effective biofractions will then be tested under greenhouse and orchard conditions to assess their practical value for citrus growers.

Circular Economy and Sustainability

This approach represents an excellent example of circular economy in action. Residues generated by the

citrus processing industry become a source of innovative agricultural plant protection solutions, creating additional value from materials that would otherwise have limited use. Beyond improving disease management, this strategy contributes directly to several United Nations Sustainable Development Goals (SDGs), including responsible consumption and production (SDG 12), climate action (SDG 13), industry innovation (SDG 9), and sustainable agriculture through the protection of plant health and reduction of chemical inputs (SDG 2). By converting citrus by-products into natural immunity activators, CITRUSBUSTERS demonstrates how sustainability, innovation, and plant science can work together to build a more resilient future for the citrus sector.

From citrus by-products to plant immunity

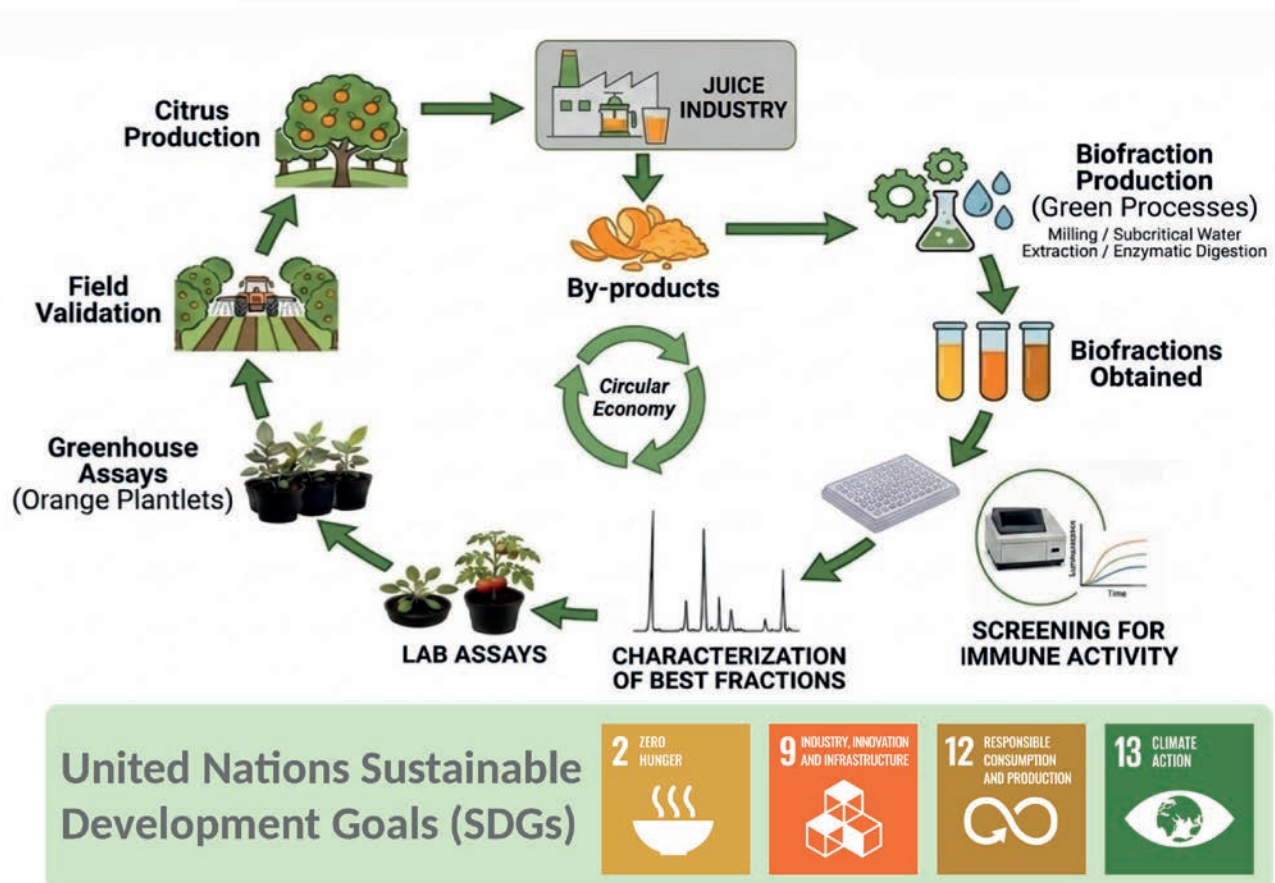


Figure 1. Circular economy approach developed within CITRUSBUSTERS. Citrus-processing by-products, particularly orange and mandarin peels, are valorised through environmentally friendly extraction and enzymatic treatments to generate biofractions enriched in cell wall-derived molecules capable of activating plant immunity. Candidate biofractions are screened and characterized in laboratory assays, validated for their ability to enhance disease resistance in model plants under controlled conditions, and subsequently evaluated in citrus plantlets against HLB and CBS. The most promising biofractions will ultimately be tested under greenhouse and orchard conditions as natural and sustainable tools for citrus protection.



More information: [Project – citrusbusters.eu](https://project-citrusbusters.eu)

Join our community and help shape the future of sustainable citrus farming.

Sustainable Juice Platform: Turning Collaboration into Action

Mario Diaz, Sustainable Juice Platform Chair and Sustainability & Climate Resilience Lead at Innocent.

Recent heatwaves and extreme weather events have once again highlighted the growing challenges facing our sector. As climate-related risks such as drought, extreme temperatures and unpredictable rainfall become more frequent, building resilient supply chains has become a strategic priority for the industry. Farmers are at the forefront of these challenges, facing increasing pressure on yields, fruit quality and long-term productivity, while companies across the value chain must adapt to ensure a secure and sustainable supply of raw materials. Through the Sustainable Juice Platform (SJP), stakeholders from across the value chain are working together to address these challenges and build a more resilient and sustainable juice sector.

Working alongside AIJN's Sustainability Strategy, SJP provides a collaborative platform where growers, processors, bottlers, traders, retailers, researchers and civil society organisations can identify common challenges, share knowledge and develop practical solutions. For SJP, the AIJN Sustainability Strategy provides a common framework that helps align efforts across the industry, enabling companies to tackle shared challenges more effectively and drive greater impact together.

Supporting Farmers Through Regenerative Agriculture
Regenerative agriculture has been a major focus for SJP in 2026. Improving soil health, biodiversity and climate resilience is becoming increasingly important for the long-term sustainability of fruit production, while helping farmers adapt to changing climatic conditions.

A good example is the Apple Project in Poland, developed in partnership with the Sustainable Juice Covenant and other sector organisations. The project covers 150 farms, combining regenerative agriculture practices with monitoring soil health, biodiversity and greenhouse gas emissions. The expectation is for a 10% reduction

in emissions for the three-year duration of the project against a baseline done in 2024 using the Cool Farm Tool, while generating valuable data for future sector-wide initiatives.



Improving Conditions for Agricultural Workers

At SJP, we believe climate action and social justice go hand in hand. Supporting resilient farming communities requires both environmental stewardship and respect for the people working throughout agricultural supply chains.

A key SJP initiative has been the rollout of the Just Good Work app in Spain and Poland. The app provides migrant workers with accessible information on labour rights, working conditions, health and safety, and local support services. By putting practical information directly into workers' hands, this digital solution helps promote responsible recruitment and improve worker wellbeing across agricultural supply chains.



Building Stronger Partnerships in Brazil

Another important milestone has been the continued development of the Brazilian Working Group. Bringing together growers, processors, cooperatives, research institutes and sustainability organisations, the group provides a forum for addressing common sustainability challenges and identifying opportunities for collaboration within the Brazilian citrus sector.

Over the past year, members have formalized their participation through a shared Terms of Reference and launched a stakeholder survey to identify priority topics and future areas of collaboration. The group is helping strengthen links between Brazilian stakeholders and European sustainability initiatives while fostering knowledge exchange on regenerative agriculture and social sustainability.

An additional initiative attracting attention in Brazil is [Bons Frutos \(“Good Fruits”\)](#), a programme that promotes responsible employment practices throughout the citrus sector. Through awareness campaigns and educational materials, the initiative encourages legal compliance, respect for workers and improved working conditions. Its message is simple but powerful: sustainable citrus production depends not only on healthy orchards and quality fruit, but also on ensuring that the people working in the fields are treated fairly and with dignity.



Looking Ahead

Looking ahead, SJP will continue to focus on regenerative agriculture, responsible recruitment and collaborative projects that generate measurable impact. As the sector prepares for Juice Summit 2026, where AIJN, SJP and the Sustainable Juice Covenant will present a joint sustainability booth for the first time, there is a growing opportunity to demonstrate how collective action can help build a more resilient and sustainable future for the juice sector. By bringing together diverse stakeholders and translating shared ambitions into practical solutions, the industry is creating the conditions for the systemic change that no single organisation could achieve alone.

“Sustainable citrus production depends not only on healthy orchards and quality fruit, but also on ensuring that the people working in the fields are treated fairly and with dignity.”



Businesses face new environmental management expectations as ISO 14001 receives a major update

Katie Elmer, Business Development Manager. JPR Solutions

Organisations are being urged to review their environmental management systems following the publication of ISO 14001:2026, with experts warning that while the changes aren't a complete overhaul, they will require businesses to demonstrate stronger leadership, improved environmental risk management and greater use of performance data.

For many organisations, environmental management has long been about meeting compliance requirements and reducing waste. But the latest revision to the internationally recognised ISO 14001 standard signals a shift in expectations, placing greater emphasis on integrating environmental considerations into everyday business decisions rather than treating them as a standalone exercise.



The revised standard, which replaces ISO 14001:2015, introduces clearer requirements around:

- understanding environmental conditions
- strengthening leadership accountability
- managing organisational change
- using environmental performance data to drive continual improvement

While the core Environmental Management System (EMS) structure and the familiar Plan-Do-Check-Act framework remains unchanged, businesses are expected to show stronger links between identified environmental risks and the actions they take to address them. Organisations already certified to ISO 14001 will focus is on strengthening existing processes and ensuring environmental management is embedded across the organisation, from strategic planning to supplier management. For most businesses, the transition is expected to involve refining existing processes rather than creating entirely new ones.



THE UPDATE

The update also reflects the growing importance of issues such as climate-related risks, biodiversity and resource constraints, requiring organisations to consider how these factors influence their operations and future planning. Organisations seeking certification, or preparing for future surveillance audits, will need to demonstrate visible leadership involvement, ensuring environmental responsibilities extend beyond the environmental team and are embedded within wider business decision-making, as well as well-structured change management and meaningful analysis of environmental performance. Key changes to ISO 14001 in 2026:

Update area	What's different	What this means
Environmental context	Environmental conditions are more explicit required and must inform risks and opportunities	Context must clearly include relevant environmental factors (e.g. climate risks, flooding, biodiversity loss, resource constraints)
Leadership accountability	Stronger emphasis on top management accountability for EMS effectiveness and outcomes	Leadership must demonstrate involvement in objectives performance and decision making
Risk and opportunity linkage	Clearer requirements to determine risks and opportunities from context aspects, compliance, obligations and interested parties,	A clear line should exist between risks identified and actions taken
Clause 6.3 Planning and managing change	New requirement to plan and control changes affecting the EMS	Environmental impacts must be considered before changes such as new equipment, suppliers, materials or processes
Performance evaluation	Greater focus on evaluating performance rather than just monitoring	Organisations must define indicators, analyse trends and use data to drive improvement
Operational control	Clearer expectation to define control or influence over external providers	Contractors, suppliers and outsourced activities must be actively managed where relevant
Environmental policy	Clarifies what protection of the environment may include	Climate change and biodiversity can be included where relevant, but core commitments remain unchanged

Beyond compliance, ISO 14001 continues to offer significant business benefits, including:

- **reduced operating costs through better resource management**
- **enhanced reputation with customers and stakeholders**
- **improved regulatory compliance**
- **a stronger position when bidding for contracts.**

With a transition period expected to run until around 2029, organisations have time to prepare, but early planning is likely to make the process significantly easier. Organisations that are leading the way are incorporating the transition into their routine surveillance or recertification audits, helping to minimise both cost and disruption.

Streamline your ISO 14001 journey with expert support

Navigating the requirements of ISO 14001 doesn't have to add another layer of work for your organisation. Working with an experienced environmental consultancy can help streamline the process, from reviewing your existing Environmental Management System and identifying gaps, through to implementing improvements and preparing for certification or transition. JRP Solutions, Energy and Sustainability Consultants, support organisations to develop and manage practical, effective environmental management systems, providing the expertise and ongoing support needed to take the pressure off internal teams and keep the process moving efficiently. Their approach helps businesses meet the requirements of ISO 14001 while making sure environmental management delivers real value for the wider organisation.



ISO 20001: A New Global Standard for Tackling Food Loss and Waste

Aintzane Esturo, Technical Director IFU

Scheduled for publication in September 2026, around the International Day of Awareness of Food Loss and Waste, ISO 20001 will be the world's first ISO management system standard specifically dedicated to food loss and waste, representing an important milestone in global efforts to make food systems more sustainable and resource-efficient.

ISO 20001 – Food loss and waste management system – Requirements for the prevention and minimization of food loss and waste across the food supply chain – will provide organisations with a structured framework to prevent, measure and progressively reduce food loss and waste. The standard has been developed by **ISO/TC 34/SC 20, Food loss and waste**, and is intended for organisations throughout the food supply chain, regardless of their size or complexity.

From commitment to systematic action

While many companies have already established targets and initiatives to reduce food loss and waste, ISO 20001 introduces a management-system approach that can help turn individual actions into a systematic and continually improving programme.

The standard is designed to enable organisations to plan, implement, operate, maintain and continuously improve a food loss and waste management system. This includes documenting and monitoring procedures, evaluating performance and reporting progress. It also provides a common framework that can facilitate communication and comparison of results across the supply chain.

Its scope extends across the food chain, from primary production to the final customer or consumer, making it relevant to farmers, processors, manufacturers, transport and storage operators, retailers, food-service organisations and other actors involved in bringing food to consumers.

ISO 20001 provides a structured management-system framework that enables organisations across the food supply chain to identify, measure, prevent and reduce food loss and waste, set measurable objectives and continually improve their performance.

Relevance for the fruit and vegetable juice sector

Food loss and waste is particularly relevant to fruit and vegetable supply chains because of the **perishable nature of raw materials, seasonal production and the significant volumes of co-products and by-products generated during processing.**

For the juice industry, applying a structured food loss and waste management system could help companies identify losses at different stages of their operations, establish measurable reduction objectives and monitor improvements over time. Opportunities range from improving harvesting, handling and storage of fruit to increasing processing yields, reducing product losses during production and filling, improving inventory management and finding higher-value applications for processing side streams.

This last area is particularly relevant to the juice sector. Peels, pulp, seeds and other processing streams can increasingly become valuable raw materials for the pro-



duction of **pectin, dietary fibre, essential oils, natural ingredients, bioactive compounds, animal feed, energy and other biobased products**. Keeping these materials and resources at their highest possible value can contribute simultaneously to waste reduction, circularity and improved resource efficiency.

Supporting wider sustainability objectives

ISO 20001 will also support wider international efforts to address food loss and waste, particularly **UN Sustainable Development Goal 12 – Responsible Consumption and Production**. SDG Target 12.3 calls for halving per-capita global food waste at retail and consumer levels and reducing food losses along production and supply chains.

For the global juice industry, ISO 20001 provides an opportunity to move from individual food-loss initiatives towards a **consistent, measurable and internation-**

ally recognised management approach. By systematically identifying where losses occur and prioritising prevention, reduction and valorisation, juice producers can improve resource efficiency, reduce environmental impacts and potentially generate additional value from materials previously considered waste.



commitments into measurable action and continual improvement.



The Sustainable Juice Covenant: Turning collective ambition into measurable progress

Sonia Cordera, SJC Chairwoman. DH Director Market Engagement

Recent seasons have brought some of the toughest growing conditions our sector has faced in years. Drought and disease have affected citrus harvests in Brazil, while severe frost has damaged apple orchards across parts of Europe. These climate-related risks are a powerful reminder of why building resilient, sustainably managed supply chains has become a strategic priority for our whole industry – not simply a long-term ambition.

It is against this backdrop that the Sustainable Juice Covenant (SJC) continues its work. Founded in 2017 by a group of frontrunning juice companies and hosted by IDH, the SJC is a platform of ambitious growers, processors, bottlers, traders, retailers and civil society organisations, all committed to one shared goal: 100% sustainably sourced juice by 2030. The Covenant provides a joint definition of sustainability across the whole supply chain, from farm to final product, and a benchmarked basket of recognised sustainability standards aligned with the European Fruit Juice Association (AIJN). Beyond definitions and reporting, the SJC supports its members with collaborative supply chain projects on the ground, developing and testing innovative practices that further enhance environmental and social sustainability. This includes SJC's environmental footprint tool, which allows members to calculate and compare the carbon footprint of different juice products and identify opportunities to reduce emissions across the supply chain.

Our members

The SJC currently counts 13 member companies and partner organisations spanning the full juice value chain, from growers and processors to bottlers, retailers and standard-setting bodies. Being part of the SJC means applying an already established and recognised sustainability approach and benefiting from independent verification that allows for credible communication towards

clients and stakeholders. It also gives members access to an exchange platform of forward-looking companies, including knowledge, insights and tools from IDH, and the opportunity to co-develop sustainability solutions and team up on joint projects. Retailers, foodservice companies and NGOs are also welcome to join as supporting members, aligning with the SJC's ambition. For retailers interested in joining, SJC has recently streamlined the reporting process, making it more efficient, coordinated and better aligned with their organisational needs.



Progress towards 100% sustainable sourcing

Since the Covenant was established, the share of sustainably sourced juice volumes reported by members has grown considerably, from 7% in 2017 to a peak of 59% in 2022. As the 2025 data is currently under review, our most recent, independently verified monitoring results show that in 2024, 47% of total reported sourced mass met SJC's sustainability criteria. That is a decrease of three percentage points compared with 2023 (50%), with both a decline of total sourced volumes and sustainable sourced volumes. This decline was not the result of reduced member ambition, but of the very climate pressures described above: apples and oranges, our two largest commodities, were both hit hard by adverse weather in 2024, shrinking the pool of sustainably certified fruit available to source. It is exactly this kind of disruption that makes our work on climate resilience so important to reaching our joint 2030 target.



Image source: SJC Information Deck 2026 (IDH), page 9 – 'Projects to accelerate action: Sustainable Apple'.



Image source: SJC Activity Report 2022/23 (IDH), page 10 – 'Sustainable mango farming in India: Project Farm Gate 2.0'.

Projects that turn ambition into action

Sustainable apple sourcing in Poland

Poland is the largest supplier of apples among SJC members, yet in 2020 only 14% of the country's traded volumes were certified sustainable. To change this, SJC member Döhler launched a three-year project in 2022 to help around 100 farmers – most of them small, family-owned holdings in the Vistula valley of the Sandomierz region – adopt more sustainable practices. Supported by the SJC, the Sustainable Juice Platform (SJP) and companies Riedel, Eckes-Granini, and Keurig Dr Pepper, the project has delivered strong results up to date: participating farmers achieved SAI FSA Silver certification, increased on-farm biodiversity scores by 25%, cut nitrogen fertiliser use by 50% through regenerative farming methods, reduced pesticide use by 10% and lowered carbon emissions by 34%. Building on this success, a similar project has since launched in 2025 in the Grójec region.

Sustainable mango farming in India

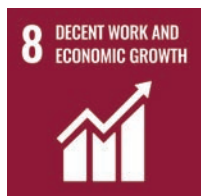
In India, the world's largest mango producer, Dutch juice company Riedel worked with local processor Foods & Inns on project Farm Gate 2.0, helping 130 smallholder mango farmers in the Ratnagiri and Konkan regions achieve FSA Silver certification for their Alphonso mangoes. Despite exceptional cyclone weather during the project period, participating farmers improved product quality, increased yields by 5.8% and grew revenue by 15%, showing that sustainable farming practices can pay off even under difficult growing conditions.

Looking ahead

For the years ahead, the SJC will keep its focus on building climate resilience through collaborative projects aimed at addressing important sustainability issues within global juice supply chains as well as increasing sustainably sourced volumes, and on further embedding its newly developed environmental footprint tool across the sector – helping members measure, compare and reduce the carbon footprint of their juice products through a dedicated working group. The SJC is also helping members prepare for upcoming due diligence legislation such as the EU's Corporate Sustainability Reporting Directive, and remains committed to improving working conditions and wages across global juice supply chains.

None of this would be possible without the trust, transparency and collective effort of our members. If you are a grower, processor, bottler or retailer working towards a more sustainable juice sector, we would welcome you to join us on this journey.

More information www.sjc2030.com





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