

EXECUTIVE SUMMARY

The fresh produce industry is at a critical inflection point, confronting a series of complex and often contradictory packaging related challenges. This includes the fragmented and rapidly evolving “regulatory gauntlet” of local and national policies, conflicting mandates from buyers and retailers, to the persistent performance gap between widely used commercial packaging and their alternatives.

At the heart of this landscape lies the “sustainability paradox”: the imperative to prevent food and materials waste while reducing GHG emissions, versus the public and regulatory pressure to eliminate or change packaging to fit a narrative rather than a science-based understanding of full life cycle performance and environmental impact. This roadmap highlights how a narrow focus on the composition and end-of-life fate of packaging materials risks increasing food and materials waste, production and commodity costs, and GHG emissions.

Prioritizing the functionality of fresh produce packaging is essential because it aligns sustainability efforts with the primary purpose of packaging: to protect and preserve the food it contains. Life Cycle Assessment (LCA) studies show that the agricultural production phase, which requires water, land, and energy to grow, process, and transport fresh produce crops, accounts for an important portion of the total environmental footprint. When the packaging or supply chain fails and food becomes food loss and waste, the entire environmental investment in that food is lost. Further, reducing material waste and emissions from the manufacturing of and supply chain for packaging materials is also critical to capture the full accountability of the GHG footprint of the fresh produce supply chain.

**Functional Sustainability is
essential as the core principle for
all sustainable packaging.**

FUNCTIONAL SUSTAINABILITY

This report champions the concept of “**Functional Sustainability**,” a holistic framework that evaluates packaging based on its performance and impact throughout the entire supply chain. Sustainable packaging cannot focus simply on if materials that make up the packaging have the capability to be recycled or composted. Functional sustainability must also include the environmental impact of manufacturing the packaging materials, as well as the ability of the packaging to preserve freshness and mitigate food safety risks, protect the product from physical damage and contamination, and improve handling and transport logistics efficiency. Packaging that prioritizes functional sustainability is therefore critical to a sustainable supply chain, safeguarding the significant environmental resources entrenched in the food chain from farm to fork.

The challenge of achieving truly sustainable packaging can be understood as threefold. **Upstream considerations** involve material science and sourcing, where decisions must be informed by LCA data that correctly prioritizes food loss and waste prevention over packaging materials reduction or substitution. **Functionality** ensures the packaging performs the core protective duties across the entire supply chain journey. **Downstream considerations** address the end-of-life reality, which includes designing for compatibility with available waste management infrastructure and navigating the trade-offs between high-performance multi-layer materials and more easily recyclable mono-materials.

SUSTAINABLE FRESH PRODUCE PACKAGING ROADMAP

To navigate this complex landscape, SPPA puts forward this Sustainable Fresh Produce Packaging Roadmap:

1. **Commit to Functional Sustainability:**

Educate the entire supply chain and shift the public narrative. Communicate how functionality is the most critical component of a sustainable packaging system and shift the simplistic focus on material type or end of life focus to a comprehensive, science-based understanding of full life cycle performance and environmental impact.

2. **Drive Targeted Innovation:**

Strategically identify and invest in innovation where it is needed most. Support the development of more effective and economical solutions tailored to the specific risks of each functional commodity group, such as better moisture-management materials for berries or cost-effective Modified Atmosphere Packaging (MAP) technologies for cut vegetables, for example.

3. Advocate for Pragmatic Policy:

Collectively advocate for pragmatic, aligned, and science-based packaging related policies and regulations. This includes but is not limited to Extended Producer Responsibility (EPR) schemes, to ensure packaging systems that demonstrably reduce GHG emissions as well as food loss and waste are rewarded. Creating incongruent rules for materials based on composition alone can lead to supply chain inefficiencies and negative environmental outcomes.

By placing functionality at the heart of the strategy, the fresh produce industry can move beyond fragmented, single-issue debates and toward integrated solutions that deliver genuine environmental, economic, and social benefits.

RECOMMENDATIONS FOR ACTION

To achieve sustainable packaging outcomes, action will be required from all stakeholders. Outlined in more detail at the end of this roadmap, SPPA puts forward these Recommendations for Action:

For the fresh produce industry (growers, packers, and packaging manufacturers), the industry must prioritize functional sustainability in design, commit to data-driven decision-making, design for downstream reality and not theory, and collaborate to standardize formats. For retailers, educate consumers at the point of purchase, revise procurement policies to reward holistic sustainability, and advocate for improved downstream infrastructure. For policy makers and regulators, establish harmonized national standards and definitions, implement pragmatic EPR policies, and fund critical infrastructure and innovation. Lastly, for academia, fill critical research and data gaps and develop standardized testing protocols.

Sustainable fresh produce packaging cannot be effectively progress in isolation. Functional Sustainability offers a unifying framework, and success will require coordinated action among all stakeholders and the full supply chain. Only through shared commitment to sustainable outcomes, science-based decision-making, and collaborative innovation can we reduce waste and emissions, and pave the way for a cohesive, industry-wide shift to more functional, economical, and environmentally conscious packaging.