COMPOSTING CONSORTIUM

BPI

Unpacking Labeling and Design: **U.S. Consumer Perception of Compostable Packaging**

Acknowledgements

The information from this report comes from a joint project between Closed Loop Partners' (CLP) Center for the Circular Economy ('The Center') and the Biodegradable Products Institute (BPI).

Thank you to our partner network who made this possible:

Biodegradable Products Institute: Biodegradable Products Institute is the leading authority on compostable products and packaging in North America. All products certified by BPI meet ASTM standards for compostability, are subject to eligibility criteria around the connection to food scraps and yard trimmings, meet limits for total fluorine (PFAS), and must display the BPI Certification Mark. BPI's certification program operates in conjunction with education and advocacy efforts designed to help keep food scraps and other organics out of landfills.

This report is made possible because of our valued and successful partnership with BPI to create publicly available data and drive consistent, clear communication and labeling of compostable packaging. In 2020, BPI published its Guidelines for the Labeling and Identification of Compostable Products and Packaging to provide clear labeling guidance for brands and manufacturers. The guidelines serve as a design resource for stakeholders, such as packaging manufacturers, brands and initiatives, like the Composting Consortium (Consortium), to guide industry towards circular outcomes.

Composting Consortium: The Composting Consortium, managed by the Center for the Circular Economy at Closed Loop Partners, is a multi-year collaboration across the entire compostable packaging value chain to pilot industry-wide solutions and build a roadmap for investment in technologies and infrastructure that enable the recovery of compostable food packaging and food scraps.

Our Consortium's Founding, Supporting, Industry and Advisory Partners constitute seven brands, two manufacturers, four industry groups, eight non-profits/NGOs and three academic institutions, along with nine Composter Partners. These businesses and organizations have provided invaluable feedback, support and direction in the development of this survey. Without them this research would not be possible.

Closed Loop Partners: Closed Loop Partners, managing partner of the Consortium, guided data analysis, storytelling and report development. Caroline Barry and Paula Luu are the lead authors of this report. The supporting writing team includes Georgia Sherwin, Sonia Mahajan, Kate Daly and Bea Miñana.

Bellomy Research: Market intelligence firm, Bellomy Research, conducted 2,765 surveys with the U.S. general population, performed data analysis, synthesized information and helped design the survey.

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Thank You to the Composting Consortium Partners

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TABLE OF CONTENTS

Foreword

The landscape around compostable packaging and composting infrastructure in the United States is rapidly evolving. The demand for alternatives to traditional fossil fuel-based, single-use plastic packaging is growing steadily in the face of increased regulation and consumer preference.

Certified, food-contact compostable packaging has the potential to offer several environmental, economic and social benefits. The use of compostable packaging can divert food waste from landfills to organics recycling, thereby reducing greenhouse gases emitted when food decomposes in landfills.

If certified compostable packaging is not appropriately collected and processed at its end of life,[1] though, a significant portion of its value is lost. One major challenge to capturing the full potential of certified compostable packaging is the uncertainty surrounding how to accurately identify and divert these materials to the correct waste streams.

That is why Closed Loop Partners' Center for the Circular Economy launched the Composting Consortium, a multi-year collaboration across the entire compostable packaging value chain to pilot industry-wide solutions and build a roadmap for investment in technologies and infrastructure that enable the recovery of compostable food packaging and food scraps. In December 2022, the Biodegradable Products Institute (BPI) and the Composting Consortium surveyed 2,765 U.S. respondents to test how different approaches to design and labeling affect how consumers identify, perceive and dispose of compostable product packaging.

Our goal was to identify effective design and labeling techniques to improve the diversion of food-contact compostable packaging to the appropriate material stream.

Over the last decade, the volume of compostable materials in the market has been steadily increasing, and the market for compostable packaging is poised to grow 17% annually between 2020 and 2027. Yet there remains limited publicly available data on U.S. consumer perception of compostable packaging design and labeling. As the compostable packaging industry continues to innovate rapidly, we must find ways to simplify and standardize approaches to the design and marketing of these new materials. This groundbreaking, joint study between the Consortium and BPI offers first-of-its-kind, publicly available data on U.S. consumer perceptions of compostable packaging.

Consumer identification is just one piece of a complex puzzle when it comes to diverting food waste from landfills, capturing compostable materials and eliminating contamination[2] from U.S. organics and recycling streams. Future studies are needed to build upon this research and drive towards a future in which compostable packaging is value-additive to the system, easily identified and correctly discarded by consumers, and readily accepted, recovered and processed by composters, adding value to their businesses.

The Consortium hopes the industry will reference this foundational study to:

- Guide consistency across the labeling of both compostable and conventional plastic packaging to support accurate consumer identification of compostable packaging;
- Reduce contamination in organics recycling and plastics recycling streams;
- Advocate for clear, local- and state-level polices that standardize labeling and mitigate consumer confusion.

1 **End of life:** Where the material is intended to go after it is used.

2 **Contamination:** In composting, a contaminant is found in the feedstock that arrives at the facility and is an input that negatively affects the finished compost quality, such as glass, metal, rocks, a toxic or hazardous material (i.e., PFAS) or most commonly, conventional plastic. Within this report, we emphasize how conventional plastic packaging, referred to as "look-alike packaging" are contaminants to composters.

KEY FINDINGS: SUMMARY OF CHALLENGES AND SOLUTIONS IN LABELING COMPOSTABLE PACKAGING OUTLINED IN THIS REPORT

Design for Circularity

CHALLENGES

1. **Up to 49% of respondents had difficulty distinguishing between the terms "compostable" and "biodegradable"** which can lead to improper disposal of compostable packaging at its end of life.
2. **The phrase "made from plants" is often used on both recyclable and compostable packaging.** Up to 50% of respondents said they would place packaging labeled with "made from plants" in the composting bin.

SOLUTIONS

1. **Reconcile confusing terms** used on packaging, including but not limited to "biodegradable" and "made from plants."
2. Brands and retailers must prominently call out industrial or home compostability on their packaging to explain end of life disposal to consumers. Our research found **consumers best understood and preferred packaging that used two to three design elements** (e.g., coloring, text size, etc.) to indicate compostability.

Educate Consumers

CHALLENGES

1. **Many consumers do not know where to dispose of compostable packaging at its end of life.** 28% of respondents said they would place compostable packaging in the recycling bin.
2. **Organics collection access and infrastructure do not necessarily improve consumer comprehension** of where to dispose of compostable packaging.
3. **Not all home composters understand the limitations of a commercially compostable item.** One-third of respondents said they would place commercially compostable items into their compost bins or piles at home.

SOLUTIONS

1. **Educating the U.S. population on what packaging should be placed in the recycling bin** and industrial organics bin is critical to ensuring the success of clean material streams in both recovery systems.
2. **Municipalities and local governments with zero waste targets can help bridge this comprehension gap** by partnering with brands, retailers, haulers, composters, NGOs and others on educational campaigns to encourage new social norms and sustainable behavior.
3. As the market for home composting continues to grow, **home composting certification standards can help distinguish items** that have been specifically designed and tested for home compost bins and piles.

Collaborate Across the Value Chain

CHALLENGES

1. **A disjointed approach with local and state level policies and regulations** that govern packaging design and labeling creates unnecessary friction and pain points for consumers, brands and composters.

SOLUTIONS

1. **Policymakers, brands and retailers can work together to harmonize the policies, regulations and design** of compostable packaging nationally so it works for brands across several sectors and packaging of all shapes and sizes.

INTRODUCTION

ABOUT THIS REPORT

In December 2022, Closed Loop Partners' Center for the Circular Economy and the Biodegradable Products Institute (BPI) collaborated on a joint study as part of our partnership within the Composting Consortium. Prior to embarking on this research, we realized there was a data gap in the market: an absence of publicly available information on the efficacy of compostable packaging labeling, designs and techniques. There was also a dearth of data to support assumptions on what types of labels and designs drive confusion among consumers, and what may be leading to improper disposal of these items at the end of their use.

To address this gap, we created and distributed a digital consumer survey to 2,765 respondents throughout the U.S. with the help of market intelligence firm, Bellomy Research. Our goal was to understand how different approaches to design and labeling affect how consumers identify and perceive compostable product packaging. This digital survey serves as the foundation for future consumer labeling research and highlights the need for a more strategic approach to the design, labeling and manufacturing of both compostable and conventional packaging.

Within our research, we outline many of the key challenges related to packaging labeling and design and offer a suite of solutions to address them. We also examine the implications and plausible ripple effects of business as usual. The visual on the previous page summarizes these challenges and solutions within three overarching categories: Design for Circularity, Educate Consumers, and Collaborate Across the Value Chain.

This groundbreaking, joint study between The Center and BPI offers first-of-its-kind, publicly available data on U.S. consumer perceptions of compostable packaging.

This consumer insights study is one facet of a larger body of work by the Composting Consortium to drive value across the composting industry and inform the best path forward to achieve circular outcomes for compostable packaging. Learn more about this collaborative effort at www.closedlooppartners.com/composting-consortium/.

HOW TO USE THIS DATA

As a digital survey, the data from our research should be used as an indicator to help drive the industry forward. We do not claim these are definitive answers about real-world behaviors given this study was not an observational study conducted in real-life circumstances. It is also important to acknowledge the "say-do" gap in the context of this consumer study. The "say-do" gap refers to the inconsistency between what people say they would do versus what they actually do in practice.

These crucial, initial findings highlight the need for additional, complementary studies to advance the understanding and implementation of compostable packaging. The data from this study can provide guidance to brands, manufacturers, consumers, policymakers, municipalities, composters and other stakeholders across the value chain on how to achieve a more circular future for compostable packaging.

METHODOLOGY

The learnings in this report are derived from a digital survey issued by the Composting Consortium and BPI. The survey was designed to test how different approaches to design and labeling affect how consumers and end-users identify and perceive compostable product packaging.

Bellomy Research supported the survey creation, distribution and data analysis. The survey used mixed methods deploying both qualitative and quantitative questions and an Anchored MaxDiff (otherwise known as Best-Worst) approach that allowed us to understand why a respondent rated designs in a specific manner.

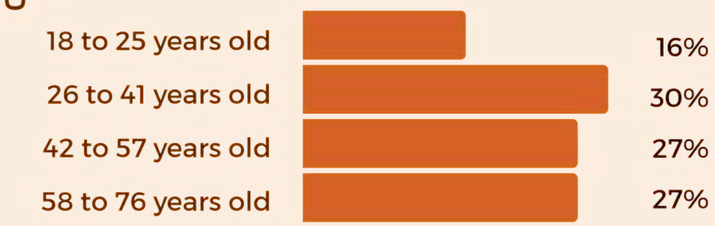
MaxDiff (i.e., Maximum Difference Scaling) allowed the respondent to select a "most identifiable" and "least identifiable" option. Asking respondents to choose across multiples sets and screens allowed for a clearer differentiation than other common survey approaches, such as ratings scales or "check all that apply." Anchored MaxDiff uses an algorithm to create an index score comparison against "the average." In this case, the average was 100 and scores were relative and comparable. For example, a score of 200 means the product or package was twice as likely to be identified as compostable. Without Anchored MaxDiff, we would have had no way to deduce which products were more or less effective at conveying compostability.

In December 2022, we surveyed 2,765 respondents in line with the U.S. general population. Respondents were allowed to take the survey on desktop and mobile devices. To ensure a representative U.S. sample, quotas were established and weights were applied to balance age, gender, racial identity, ethnic identity, Census region and household income across the entire pool of respondents.

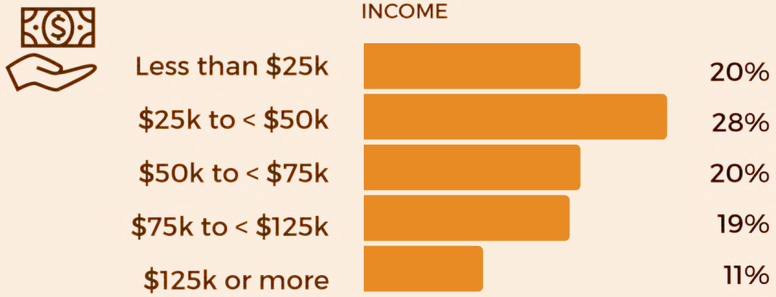
WHO WE SURVEYED

FIGURE 1. DEMOGRAPHIC SUMMARY OF SURVEY RESPONDENTS

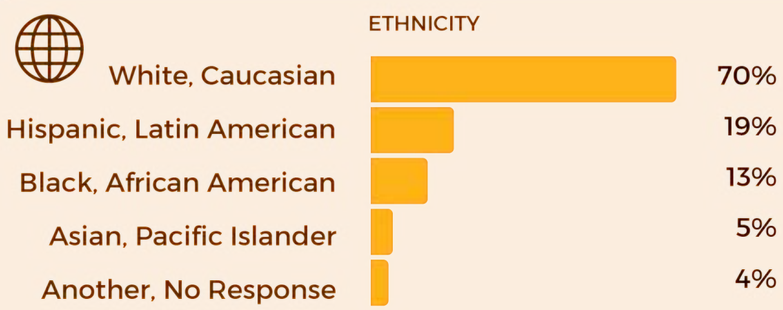
AGE



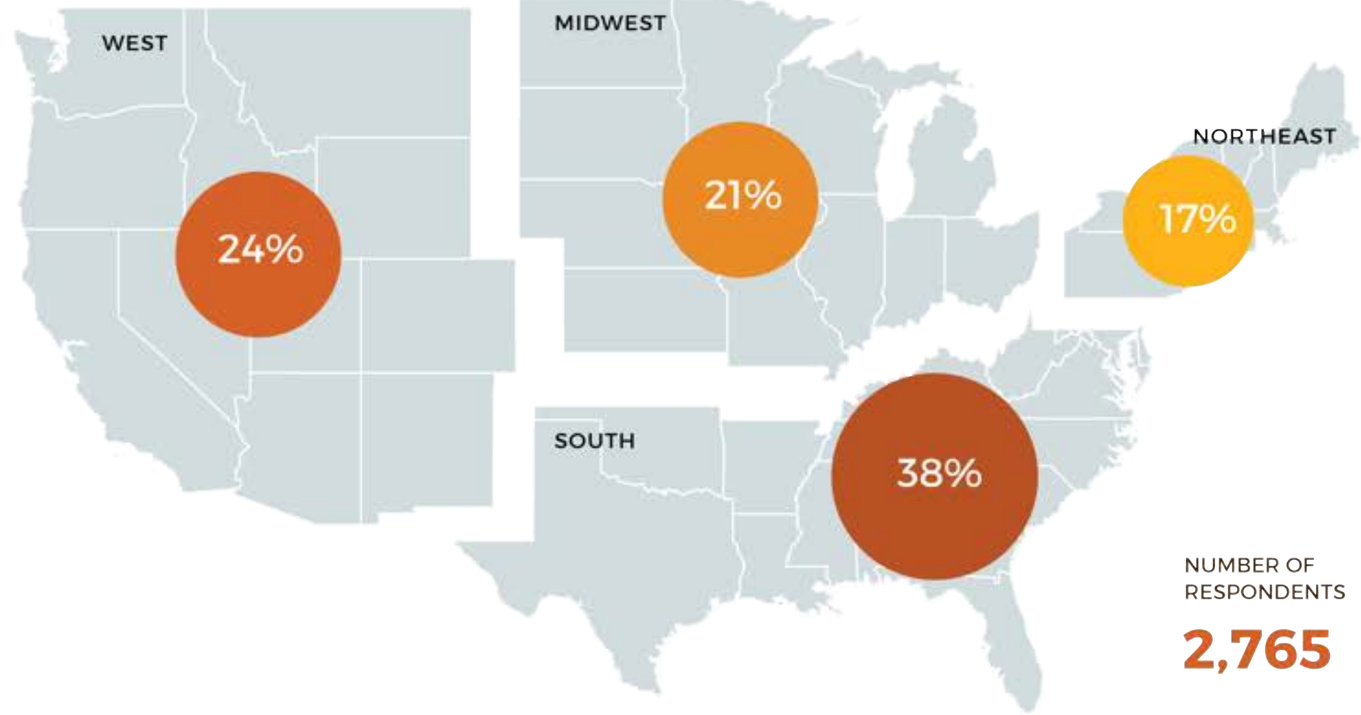
INCOME



ETHNICITY



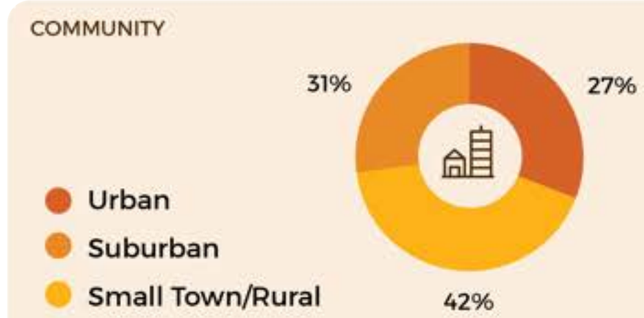
REGION



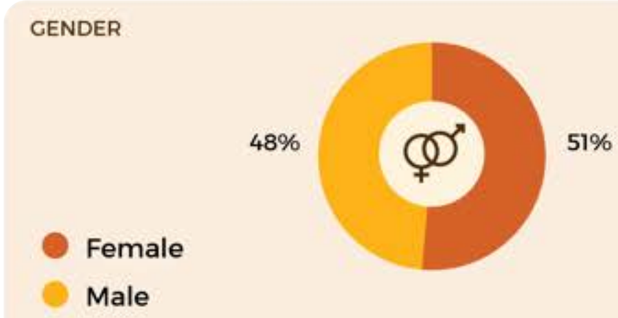
NUMBER OF RESPONDENTS

2,765

COMMUNITY



GENDER



WHAT WE TESTED

We tested 156 design combinations across 10 compostable packaging product categories and three conventional plastic categories using the imaginary brand, RightPack, inspired by BPI's labeling guidelines.[ii] Each respondent was assigned to two product categories they had used in the previous three months to ensure a level of familiarity. A screening question was included at the start of the survey to determine which types of products and packaging the respondent had interacted with over the past three months.

All labeling techniques tested (e.g., printing, embossing, tinting and material coloring) are prevalent and in use today. We tested labeling elements that are commonly found on compostable and conventional packaging, so respondents were likely to have experienced these elemental designs in their daily lives. Many of these design techniques are referenced in state labeling laws, including California, Colorado, Maryland, Minnesota and Washington.

The structure of the survey allowed us to assess packaging in a confined, consistent manner across a wide range of single-use, foodservice products. The sample list was representative and reflective of the volume of foodservice and food-contact compostable packaging that exists in the market today. BPI and Composting Consortium partners, made up of subject matter experts across brands, industry groups and environmental NGOs, refined the survey scope in September and October of 2022.

FIGURE 2. PRODUCT CATEGORIES TESTED IN THE DIGITAL STUDY

FIGURE 3. LABELING TECHNIQUES AND ELEMENTS TESTED

Large, prominent "compostable" call out vs. small, less noticeable "compostable" callout

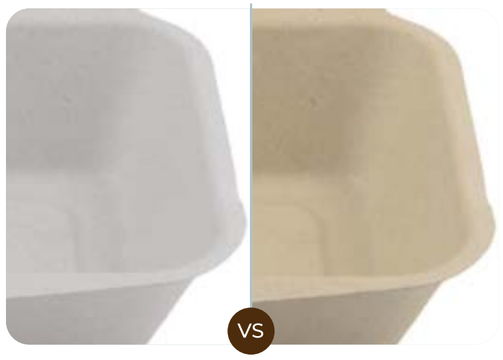
Inclusion vs. absence of striping

Tinted packaging vs. clear packaging

Inclusion vs. absence of BPI certification mark

Printing vs. embossing

Print color and text (e.g., green vs. brown)



Package color (e.g., white vs. natural)

Certified compostable packaging is a subset of biodegradable[1] materials. It is important to note that a product or package marketed as “biodegradable” is not held to the same regulatory standards as an item marketed as “certified compostable.”

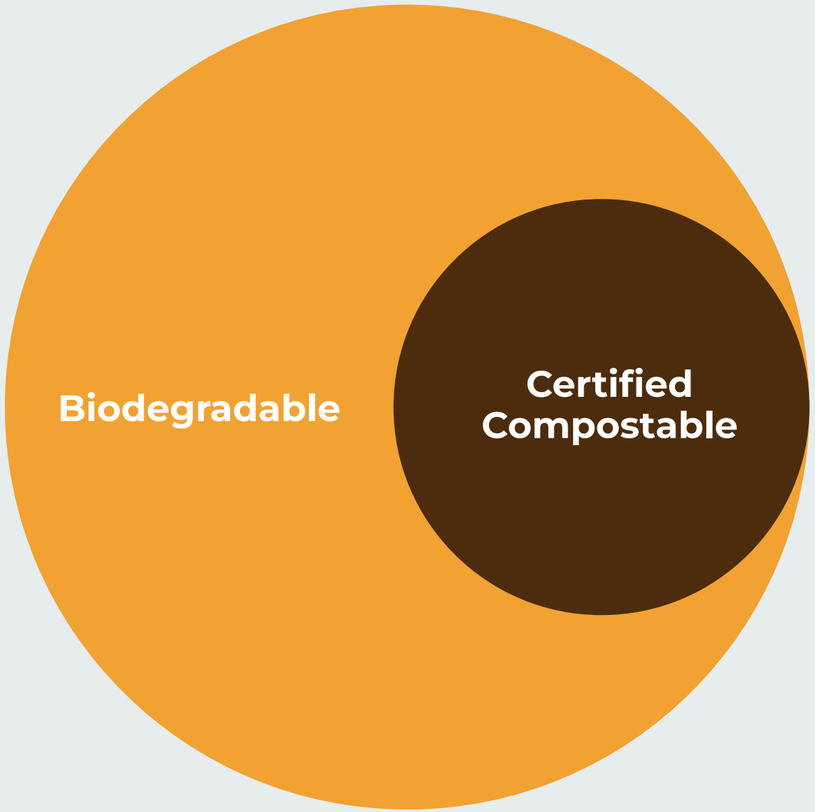
All certified compostable materials are inherently biodegradable in a composting environment, but not all biodegradable materials are safely compostable.[2]

Biodegradable materials break down into gases like carbon dioxide, water and microbial biomass under various rates and conditions. Compostable packaging is not designed to fully break down in landfill which varies in temperature, moisture and other factors. In the absence of the required conditions such as temperature, moisture and microbial presence, biodegradable material may endure in the environment for extended periods, or worse, break down into smaller microplastics without undergoing genuine biodegradation. Certified compostable packaging breaks down under specific conditions and timeframes into a format that can integrate into the soil without causing contamination, acting as a bulking agent and carbon source in the organics pile alongside the nutrient-rich food scraps carried with it.

1 **Biodegradable:** Material that can be consumed by microbial activity (bacteria and/or fungi) into carbon dioxide, water vapor and microbial biomass. (Navigating Alternative Plastics in a Circular Economy, Closed Loop Partners).

2 **Compostable:** Material capable of undergoing aerobic biological decomposition in a compost system, such that the material becomes visually indistinguishable and breaks down into carbon dioxide, water, inorganic compounds and biomass (US Composting Council).

FIGURE 4. KEY DEFINITIONS



Biodegradable

- Will break down into gases (CO2), water, residue and microbial biomass
- May refer only to biodegradable additives or components of the packaging, which can lead to microplastics

Certified Compostable

- Will break down within a specified timeframe and into non-toxic materials
- Will add value to the planet’s ecosystem through nutrient-rich materials

See Figure 7 for a breakdown of bio-based plastics vs. biodegradable plastics.
Source: Navigating Plastic Alternatives in a Circular Economy

CHALLENGE 1

Up to 49% of respondents had difficulty distinguishing between the terms "compostable" and "biodegradable," which can lead to improper disposal of compostable packaging at its end of life.

Within the context of this report, we refer to two types of microplastics. The first are microplastics that are remnants from certified compostable packaging; these biodegradable microplastics will fully break down with additional time and under specific composting conditions. The second type of microplastic comes from oxo-degradable plastics which are conventional plastics that contain biodegradable additives and are not certified compostable. Oxo-degradable plastics persist as huge quantities of microplastics (i.e., smaller than 5 mm in size), which take thousands of years to fully disintegrate and cause significant harm to marine and soil life. Many large corporate brands have committed to stopping the use of oxo-degradable plastics, but oxo-degradable foodservice ware is still widely distributed in the United States and sometimes falsely marketed with terms like "bio-fading".

When a compostable material or package is examined for certification, it is rigorously tested in a lab to ensure it degrades to a point of becoming bioavailable.[3] The BPI certification process provides a thorough technical review of independent tests on compostable materials and products to ensure they meet standard specifications for labeling plastics, such as ASTM D6400 or D6868, and do not use per- and polyfluoroalkyl substances (PFAS) or harmful toxins. When a package is certified industrial compostable, it has been verified in the lab to break down safely in a commercial composting facility, without leaving behind any harmful traces.

The Compost Manufacturing Alliance offers in-field testing by evaluating a range of compostable items to assess whether they breakdown in modern, large-scale compost manufacturing facilities. To qualify for field testing, compostable items must meet ASTM D6400, D6868 or EN 13432 testing standards or BPI certification.

Our digital study revealed that labeling a single-use plastic bag, cutlery or clamshell container as "biodegradable" resulted in a significant level of confusion among consumers, with 31% to 49% of respondents misidentifying the package as compostable (see Figure 5). These findings indicate a meaningful level of confusion across multiple categories, highlighting the importance of clear labeling and communication to help consumers make informed choices about packaging disposal.

Due to its misleading nature, use of the term "biodegradable" in marketing plastic products is already prohibited by law in California, Colorado, Maryland, Minnesota and Washington. This is partly because the term is frequently associated with products that do not comply with ASTM compostability standards and can disrupt composting processes as contaminants.

The Federal Trade Commission (FTC) has established guidelines and laws to regulate claims of compostability on compostable products and packaging, including, but not limited to: use of disclaimers to indicate the lack of availability of commercial compost facilities; use of third-party certification logos, like the BPI certification mark, to confirm compliance with ASTM compostability standard specifications; and adoption of distinctive colors, marks or design patterns to differentiate between compostable and conventional materials. As stricter regulations emerge and more labeling policies are implemented, it is important for brands, manufacturers and converters to be proactive in preventing unintended compliance backlash.

3 **Bioavailable:** In the context of compostable packaging, this refers to the point at which a material input degrades sufficiently to be absorbed and utilized by the soil.

CHALLENGE 2

The phrase “made from plants” is often used on both recyclable and compostable packaging. Up to 50% of respondents said they would place packaging labeled with “made from plants” in the compost bin.

Composters rely on high-quality feedstock, such as yard waste, biosolids and food waste, to create high-quality compost. Certified compostable packaging can serve as a carbon source in compost, much like yard waste. However, it becomes incredibly challenging to produce consistent, high-quality compost if organics feedstock is continuously contaminated with look-alike items. Look-alikes are items that resemble compostable products but are not actually compostable. As such, look-alikes make up a significant portion of the contamination problem in composting. The challenge of identification has led many composters to stop accepting compostable products altogether—even those that are certified compostable and safe for facilities to accept.

A look-alike is a conventional material, usually plastic, that is virtually indistinguishable from a compostable material due to similarities in labeling, design, appearance and touch.

While optical sortation has become more prevalent in recycling facilities, it is still an emerging technology in the composting industry and has not been implemented at scale in food waste processing facilities. The inherent sloppy, sludgy consistency of organics streams creates added challenges for optical sorters. Composters often resort to manual sortation and are forced to pick through piles of messy organic feedstock. As such, the sortation process is intensive, requiring significant time, energy, resources and labor.

Without obvious distinction in design, color and labeling, it can be impossible to differentiate between compostable and conventional packaging in the stream. If products and packaging look the same, they may be thrown out and deemed a contamination risk.

Mounting confusion often prompts composters to reject entire loads of organic waste due to concern of look-alike plastics contaminating the stream and rendering their compost useless. This is why look-alikes pose substantive risk to composters’ operating expenses. Without qualifier language and on-pack messaging, misleading terms on packaging can cause significant contamination issues in recycling and organics streams. Because compostable packaging can often look and feel a lot like conventional plastic, it’s easy to see how consumers make the mistake of throwing it into the recycling bin.

Look-alike packaging that is not compostable and uses the phrase “made from plants”[4] often confused survey respondents on where to place these items at end of use. Our study found labeling a single-use plastic bag, cutlery or clamshell container as “made from plants” led 31% to 50% of respondents to believe the package was compostable.

4 **Made from Plants:** Material made from plant-based or plant-derived inputs, like cassava or sugarcane. Though it can in some instances, this claim does not always indicate compostability.

FIGURE 5. PERCENT OF RESPONDENTS WHO MISIDENTIFIED PACKAGING LABELED ‘BIODEGRADABLE’ AS COMPOSTABLE

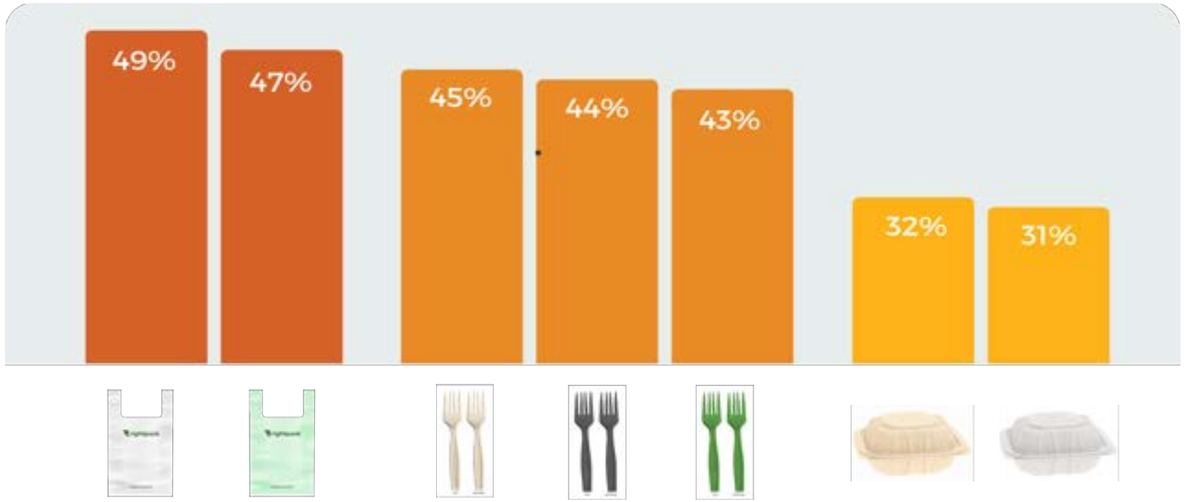


FIGURE 6. PERCENT OF RESPONDENTS WHO BELIEVED PACKAGING TO BE COMPOSTABLE WHEN IT WAS LABELED AS “MADE FROM PLANTS"

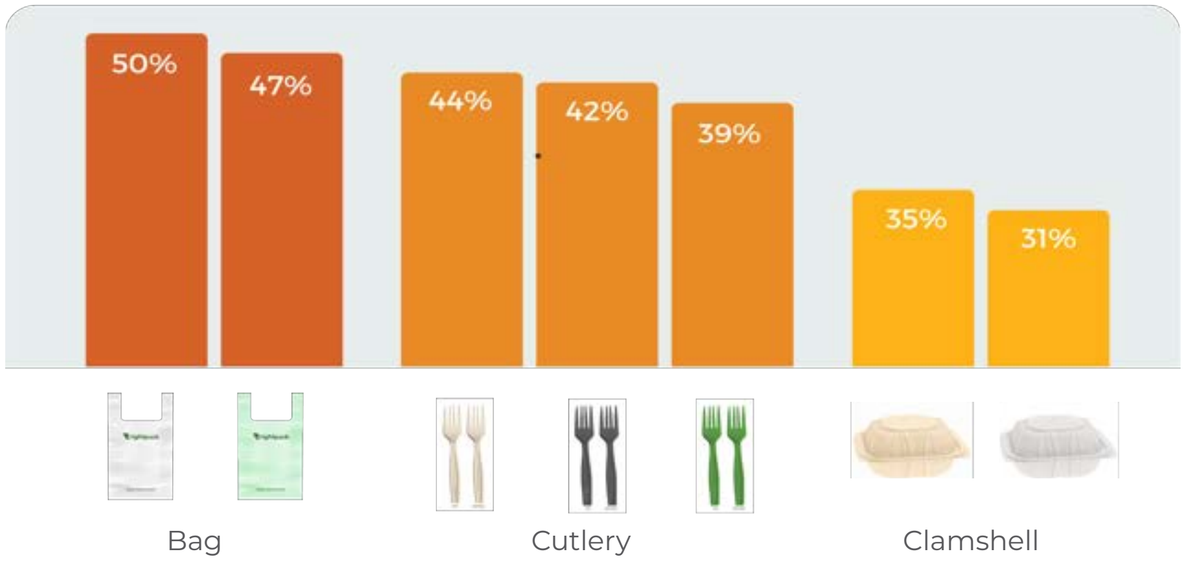


Figure 6 shows three look-alike product categories —a conventional plastic bag, fork and clamshell container—all labeled with the phrase "made from plants." We tested this “made from plants” iteration across different material coloring and tinting, as shown in the images beneath each bar. The bar graph illustrates the percent of respondents who believed these products were compostable, based on designs prominently featuring "made from plants."

In the current market, both compostable biopolymers[5] (i.e., PLA, PHA) and recyclable biopolymers (i.e., bio-based[6] polyethylene terephthalate, or bio-PET) use the phrase “made from plants” on their packaging. Most often, the phrase “made from plants” is not qualified with disclaimer language on how to properly dispose of the product or package at its end of life. The phrase “made from plants” is a legitimate and valid claim, but it describes what a product or package is made from, not how to dispose of it at end of use, and therefore requires qualifying language. The findings from our study on look-alike products and packaging signal potential contamination issues in both the organics and recycling streams.

5 **Biopolymer:** Biopolymers are a set of polymers that are naturally occurring or produced by biological organisms and are intended to biodegrade within organics processing infrastructure at their end of life. Examples of biopolymers include materials such as polyhydroxyalkanoates (PHAs) and polylactic acid (PLA) (Navigating Alternative Plastics in a Circular Economy, Closed Loop Partners).

6 **Bio-based:** Material biologically derived from plants or naturally occurring structures or biologically produced from pathways, such as microbial activity (Navigating Alternative Plastics in a Circular Economy, Closed Loop Partners).

SOLUTION 1

Reconcile confusing terms used on packaging, including but not limited to “biodegradable” and “made from plants.”

Brand marketing teams, manufacturers and converters can use proper labeling and design to facilitate quick and easy identification.

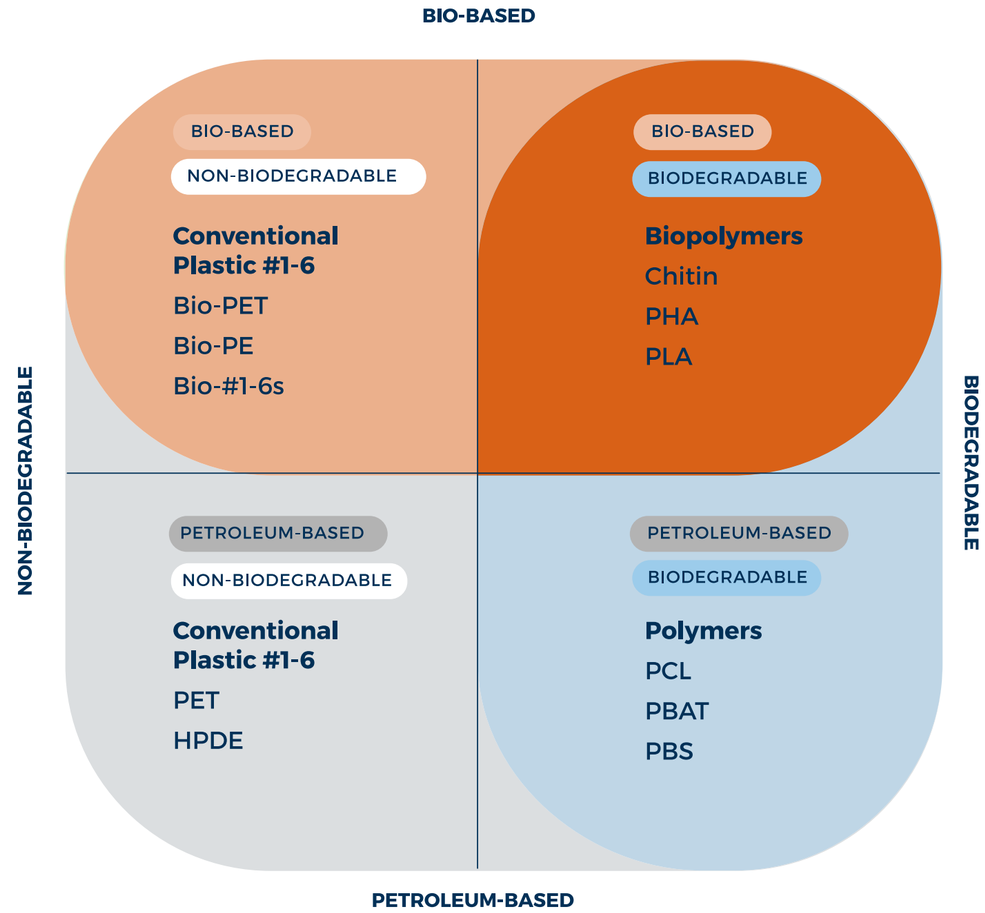
Initiatives like the U.S. Plastics Pact, a solutions-driven consortium founded by The Recycling Partnership and the World Wildlife Fund and launched as part of the Ellen MacArthur Foundation’s global Plastics Pact Network, convenes some of the most prominent consumer packaged goods brands in the world. Together, these groups work toward scalable solutions tailored to the unique needs and challenges within the U.S. landscape through knowledge sharing and coordinated action.

Findings from this study suggest that making specific design and labeling changes can increase the ability for a consumer to properly identify a product or packaging as compostable, meaning they are far more likely to dispose of it correctly after use.

Because of the conclusions drawn from our study regarding look-alike packaging, it is important for the industry to adopt techniques that mitigate confusion around these misleading terms. Achieving industry consensus and adopting consistent labeling practices can mitigate contamination challenges and enhance the overall value of compostable packaging.

It is essential to consolidate terms like “biodegradable” and “compostable” in the marketplace, and hold “biodegradable” claims to a standard that is equal to certified compostable so that these materials do not pose a risk in composting streams.

FIGURE 7. KEY DEFINITIONS



SOLUTION 2

Brands and retailers must prominently call out industrial or home compostability on their packaging to explain end of life disposal to consumers. Our research found consumers best understood and preferred packaging that used two to three design elements (e.g., coloring, text size, etc.) to call out compostability.

Visual guides are important, and our data suggests that certain elements are more effective than others at signaling compostability. We created different designs across 10 packaging categories to understand the effect different labeling elements would have on improving the identification of compostable packaging.

Packaging designs that received the highest votes are referred to as the “winning design” (see Figure 8). We found that between 19% and 68% of consumers across all packaging categories prefer the "winning design" to the “minimal design” compostable packaging labeling.

Across all 10 categories of packaging tested, the “winning design” has at least two to three design elements that communicate compostability. Our study found consumer comprehension and correct identification increases when multiple callouts communicate compostability on packages and products.

Figure 8 summarizes the lowest and highest performing designs across all 10 packaging categories. The graphic notes the percent of respondents who preferred the lowest performing and highest performing designs.

Example of best-in-class certified compostable packaging design (i.e., metalized flexible film). Source: PepsiCo, Off the Eaten Path. Released spring, 2023.

FIGURE 8. PERCENT OF RESPONDENTS WHO PREFERRED THE "MINIMAL" DESIGN VS. "WINNING" DESIGN ACROSS PACKAGING CATEGORIES

BEVERAGES

Cold Beverage Cup

Minimal Design	Winning Design
1% preferred	**22%** preferred

Hot Beverage Cup

Minimal Design	Winning Design
1% preferred	**19%** preferred

Cold Beverage Lid

Minimal Design	Winning Design
1% preferred	**51%** preferred

Hot Beverage Lid

Minimal Design	Winning Design
1% preferred	**29%** preferred

TAKEAWAY

Fiber Clamshell Container

Minimal Design	Winning Design
1% preferred	**30%** preferred

Compostable Bag

Minimal Design	Winning Design
3% preferred	**50%** preferred

FLEXIBLES

Metalized Flexible Film

Minimal Design	Winning Design
2% preferred	**68%** preferred

Non-Metalized Flexible Film

Minimal Design	Winning Design
<1% preferred	**31%** preferred

DINING

Fiber Plate

Minimal Design	Winning Design
<1% preferred	**21%** preferred

Compostable Cutlery

Minimal Design	Winning Design
7% preferred	**32%** preferred

Images have been resized to fit this report. Respondents were exposed to larger images in the survey. We tested multiple design permutations across each packaging category (e.g., 15 versions of the cold beverage cup).

FIGURE 9. INCREASE (%) IN IDENTIFICATION OF COMPOSTABILITY WHEN THE BPI CERTIFICATION MARK WAS PRESENT

FIGURE 10. INCREASE (%) IN IDENTIFICATION OF COMPOSTABILITY WITH A LARGER, PROMINENT "COMPOSTABLE" CALL OUT

Our study found the use of a larger "compostable" callout and the BPI certification mark were the two most important elements in driving the identification of compostable packaging. Across all 10 categories, the winning design always included a larger, more prominent "compostable" call out, while nine out of the 10 winning designs included the BPI certification mark.

Packaging design professionals and marketing teams can use this research as a guide to drive circularity and increase the likelihood that packaging labels will drive the correct end of life disposal of packaging.

Across an array of product category, color proved to be an effective indicator of compostability. Color can be used through a variety of methods, including inks, base materials and tinting. As seen in Figure 12, the use of natural base materials, brown or green coloring and green tinting often increased a respondent's ability to properly identify a product as compostable.

To prevent implicit bias, respondents were not presented with any definition or explanation of the BPI certification mark at any time during the survey.

Educate Consumers

⚠ EDUCATION CHALLENGES

CHALLENGE 1

Many consumers do not know where to dispose of compostable packaging at its end of life. 28% of respondents said they would place compostable packaging in the recycling bin.

28% is meaningful when considering the volume of material impacted and operational costs required to clean the recycling stream. If this consumer perception statistic holds true for actual consumer behavior, it could have serious repercussions for compostable packaging manufacturers, brands using compostable packaging and the recycling industry at large. Given this type of packaging is not designed to be recycled in traditional recycling facilities, compostable packaging improperly disposed of in recycling bins can contaminate and interfere with the recycling process.

Contamination is both costly and time-consuming. A simple remediation process can cost thousands of dollars depending on the extent and complexity of contamination, volume of material exposed to contamination and cleaning procedures. The same holds true for cleaning a compost stream contaminated with look-alike products and packaging. In the worst cases, contamination will prohibit the finished compost from being sold. Therefore, preventing ununintended contamination becomes even

FIGURE 11. WHERE SURVEY RESPONDENTS SAID THEY WOULD TYPICALLY DISPOSE OF COMPOSTABLE PACKAGING

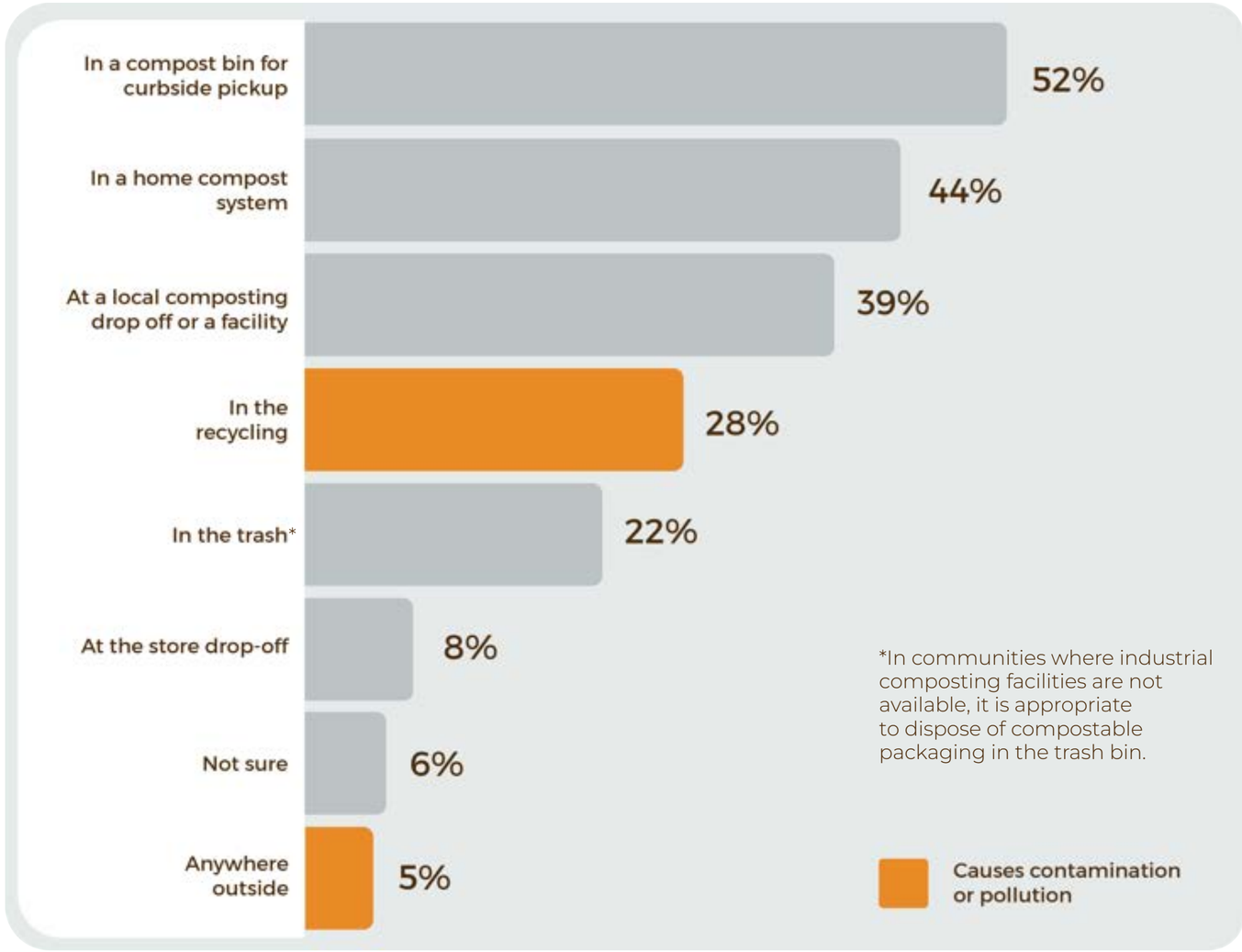
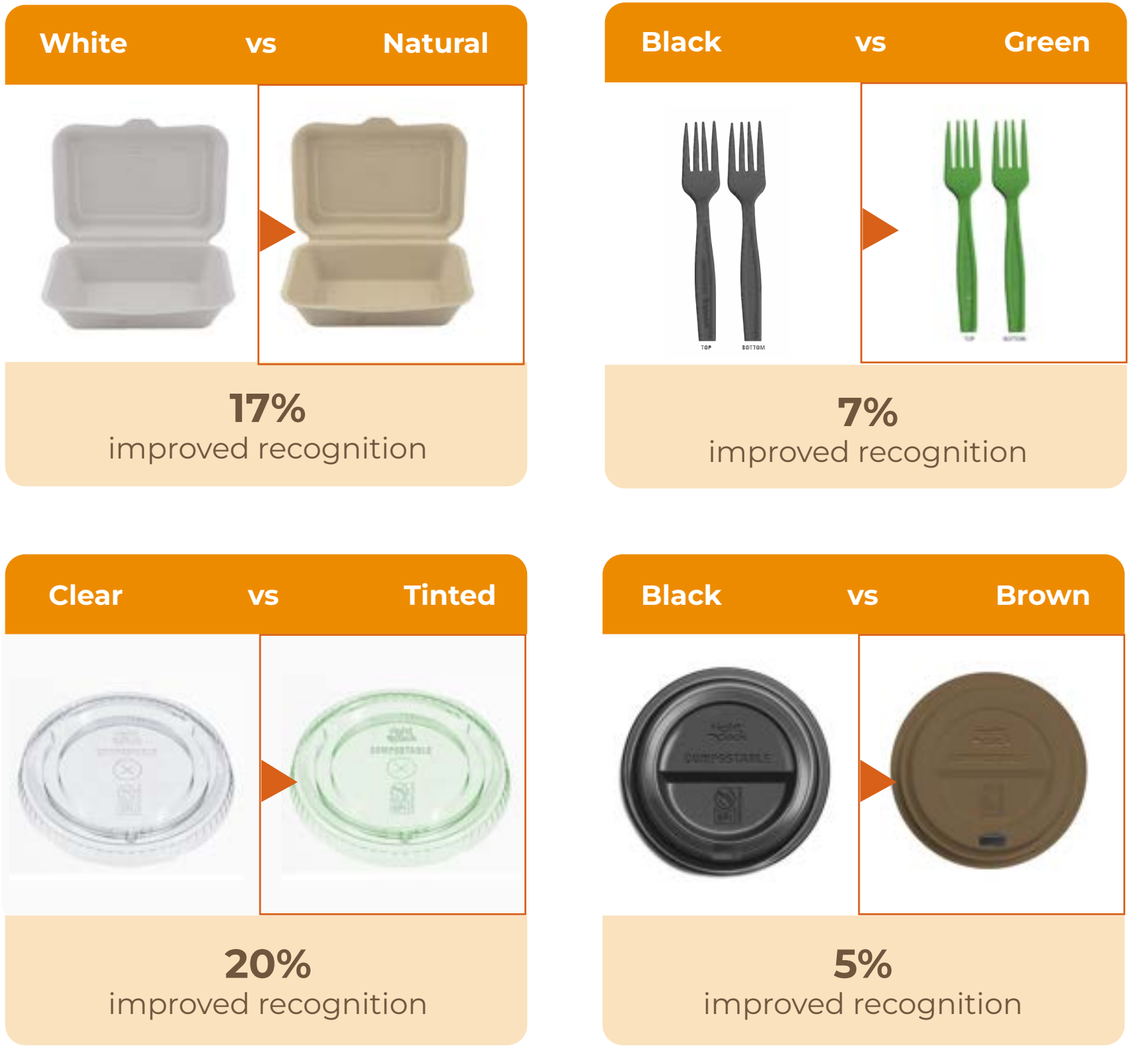


FIGURE 12. INCREASE (%) IN COMPOSTABLE IDENTIFICATION BASED ON VARYING USES OF COLOR



more important as additional compostable and bio-based packaging solutions are introduced as alternatives to conventional plastic packaging—and better end of life instructions are needed for conventional packaging headed to landfills and recycling to keep those materials out of compost streams.

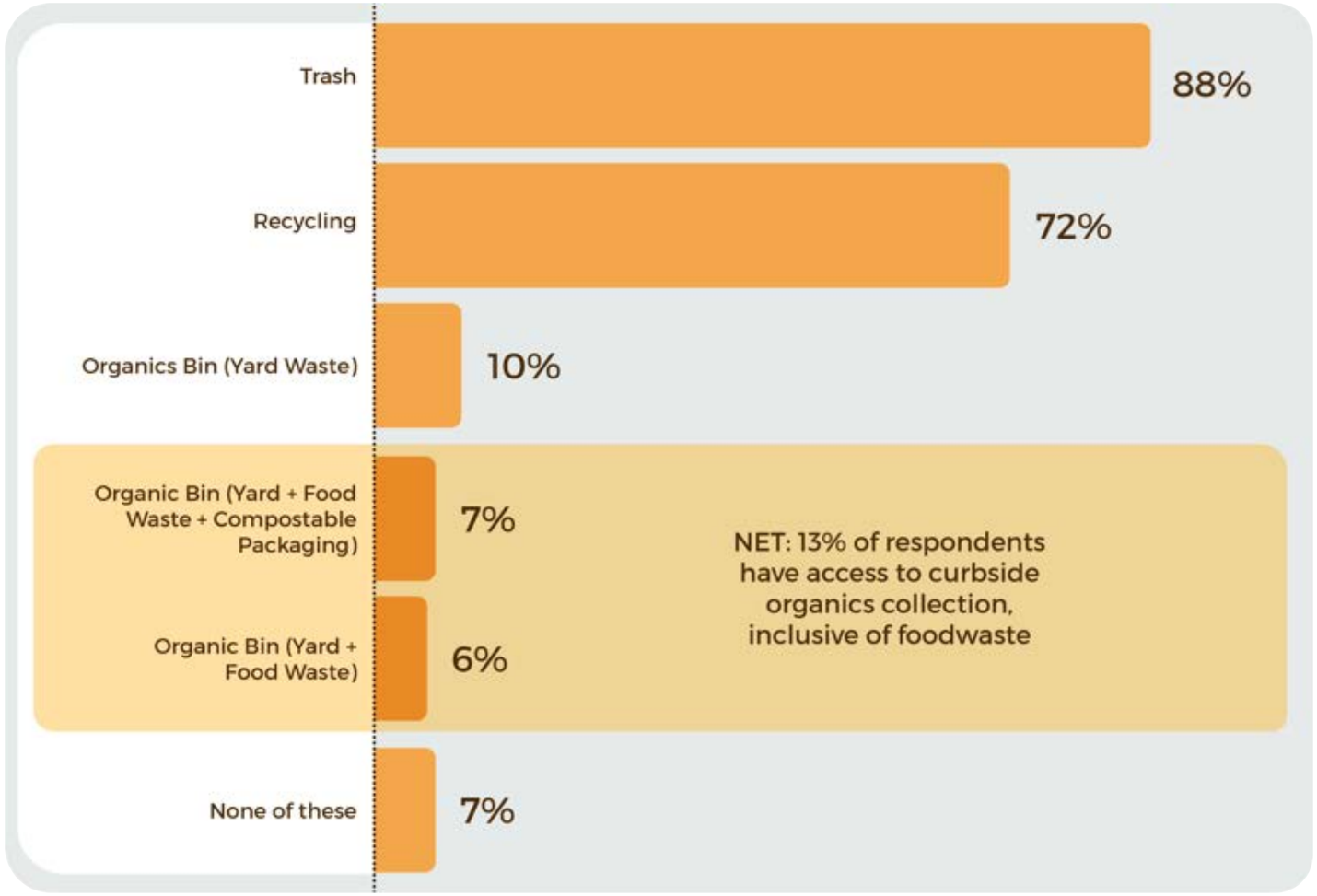
CHALLENGE 2

Organics collection access and infrastructure do not necessarily improve consumer comprehension of where to dispose of compostable packaging.

Access to curbside organics collection—at home and in public—is limited across the U.S. Fewer than one in seven respondents have access to curbside organics collection and only 7% of respondents have access to curbside organics collection that accept compostable packaging specifically. Fewer than one in five respondents have seen separate composting receptacles in public places in their local communities over the last six months.

Curbside organics collection at home was much higher among Millennials (30%), households with incomes of $100,000 or more (69%), who live in urban areas (33%), reside in the Western region of the U.S. (44%), and have children in the household (33%).

FIGURE 13. CURBSIDE DISPOSAL OPTIONS AVAILABLE TO SURVEY RESPONDENTS AT HOME*

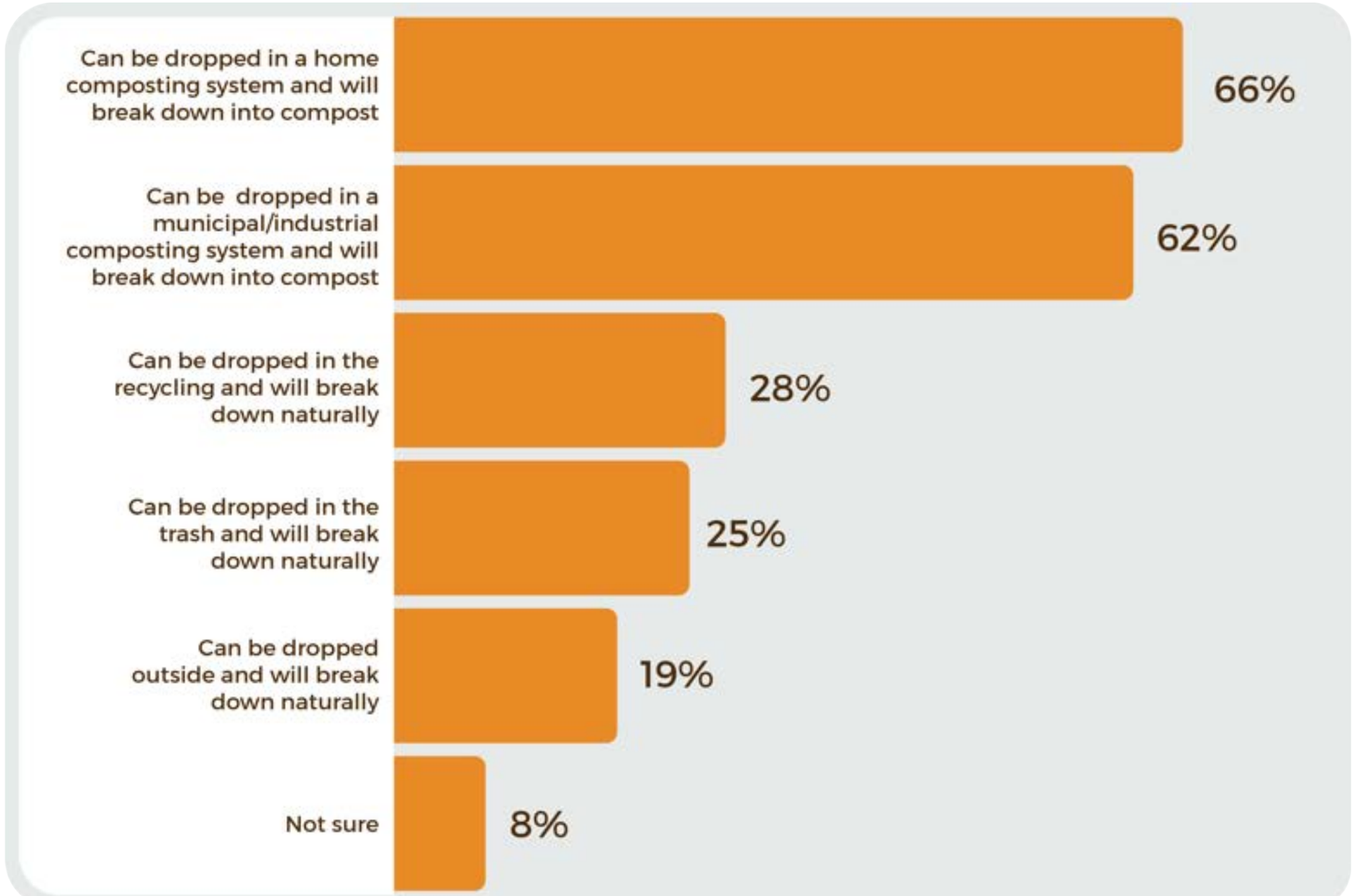


*Respondents were instructed to select all waste management options that apply.

Even when available, though, access to collection services does not appear to significantly improve consumer comprehension of where to place compostable packaging at the end of its use. For instance, in regions like the Western region of the U.S.—where people are nearly twice as likely to have access to curbside composting and 1.5 times as likely to see composting bins in public places—respondents were more likely than average to place compostable packaging in the recycling bin or to drop it outside.

Overall, 25% of respondents believe that compostable packaging can be dropped in the trash and will break down naturally, and 19% believe it can be dropped outside and will decompose naturally.

FIGURE 14. RESPONDENTS' UNDERSTANDING OF WHAT "COMPOSTABLE" MEANS*



*For this survey question, respondents were not asked to distinguish between “industrial” and “home” compostable.

Case Study: Comprehension by U.S. Region

Our regional analysis across the West, Midwest, South and Northeast showed no clear correlation between access to organics collection and understanding of compostability[1].

Living in an area where organics collection exists does not necessarily mean consumers have a better comprehension of compostability. The expressed intended behavior we observed across regions is not statistically significant from the mean, which is nearly one-third of U.S. respondents who believe that compostable packaging can be placed in the recycling bin. According to our study, respondents from the Western region of the U.S. are nearly twice as likely than the average U.S. respondent to have access at home to curbside composting.[1] Based on our findings, they are 8% more likely than the average respondent to place compostable packaging in the recycling stream. This difference is not statistically significant compared to the U.S. average (see Figure 13) and highlights the importance for consumer education as composting collection programs roll out into a city or state.

In the Midwest, we see another example of the feeble correlation between access and understanding. Just 8% of respondents from the Midwest region claimed to have access to curbside composting, and only 15% had seen compost bins in their communities over the last six months. Interestingly, Illinois (a Midwestern state) has the second greatest number of organics collection programs in the country, behind California. Yet, among all four regions, Midwesterners may have a better perceived understanding of where to place compostable packaging after it is used (see Figure 13). They are also 10% less likely than average to place compostable packaging in the recycling bin, and 11% less likely to drop it outside. This could be due to a greater investment in consumer education. For example, Minnesota's Twin City region has historically invested significant funding to maintain steady communications and education to their organics collection residents.

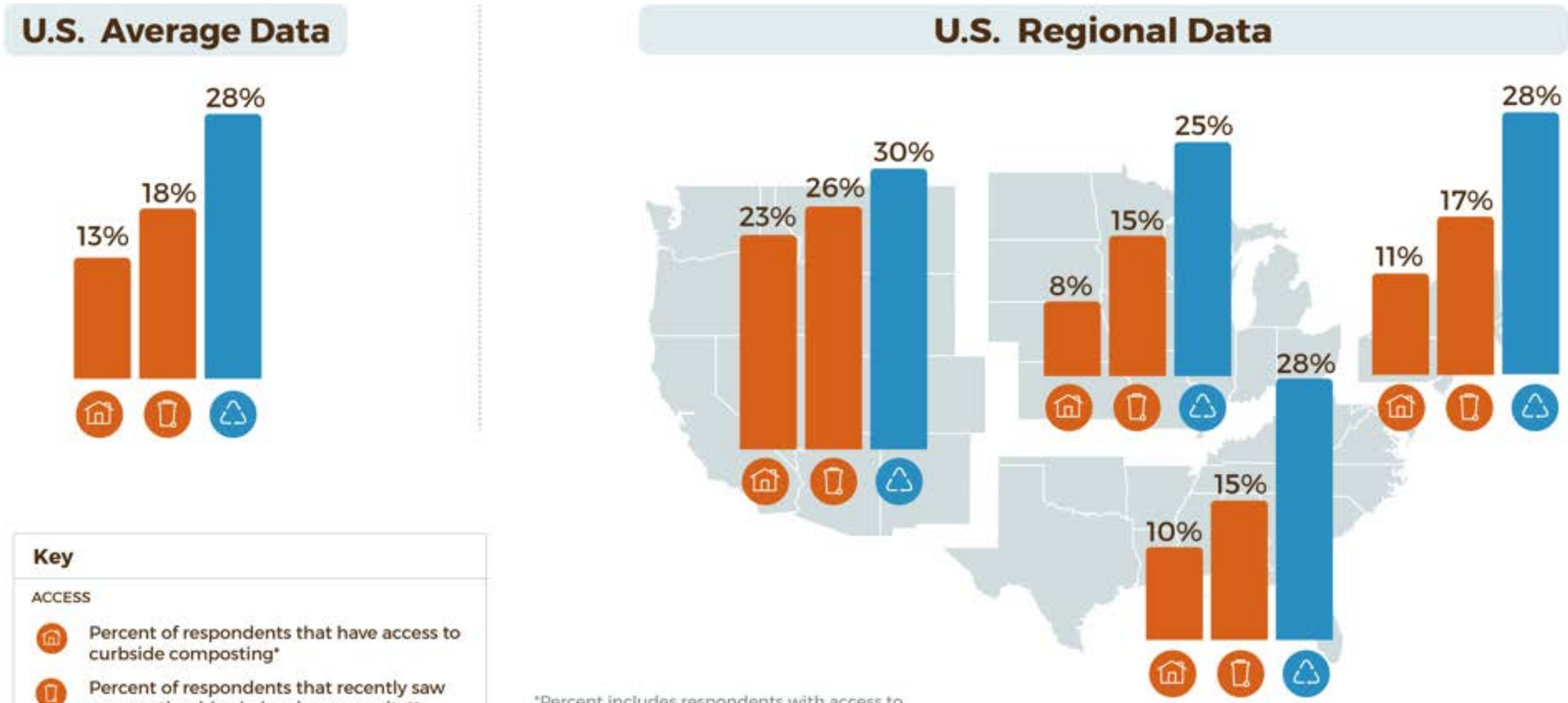
Aligning with existing organics infrastructure and collection programs in the region, our survey found respondents from the Southern region of the U.S. are 21% less likely than average to have access to curbside composting, and 16% less likely to have seen compost bins in public places.

While composting facilities are prevalent in the Northeast, only 11% of respondents from the Northeast have access to curbside composting and 17% have seen compost bins in their communities over the last six months, according to our study. This suggests facility infrastructure and curbside access are not always correlated.

1. **Western region:** Oregon, Washington, California, Nevada, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, Utah. n = 570.
Midwest region: Kansas, Missouri, Illinois, Indiana, Ohio, Michigan, Wisconsin, Iowa, Nebraska, North Dakota, South Dakota, Minnesota. n = 563.
Southern region: Texas, Florida, North Carolina, South Carolina, Virginia, West Virginia, Maryland, Kentucky, Tennessee, Alabama, Arkansas, Mississippi, Georgia, Louisiana, Delaware, Washington D.C. n = 1,015.
Northeast region: Pennsylania, New Jersey, Rhode Island, Connecticut, Massachusetts, New York, Vermont, Maine, New Hampshire. n = 507.

2. In this study, curbside composting refers to a range of organics bin options at home for collecting yard waste, a combination of yard waste and food waste, or a combinaton of yard waste, food waste and compostable packaging. See Figure 13 for more information.

FIGURE 15. ACCESS TO ORGANICS COLLECTION AND EXPRESSED DISPOSAL CHOICE BY U.S. REGION



CHALLENGE 3

Not all home composters understand the limitations of a commercially compostable item. One-third of respondents said they would place commercially compostable items into their compost bins or piles at home.

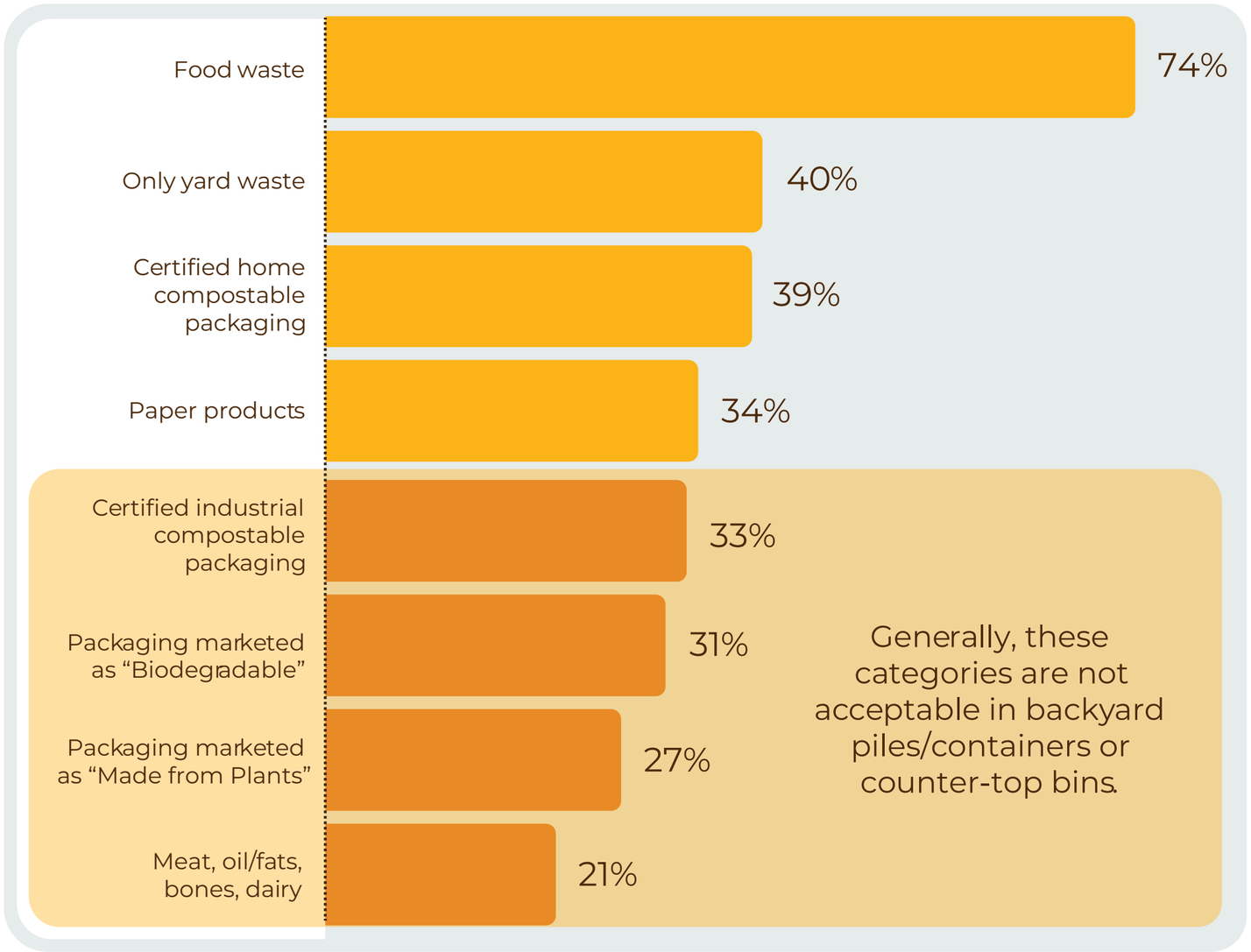
Nearly three in 10 respondents said they home compost (e.g., in their backyard). Within this cohort, around one-third of respondents place certified industrial compostable packaging, biodegradable packaging and packaging labeled “made from plants” in their home compost bin. Millennials (37%), households with incomes of $150,000 or more (41%), those living in the Western region of the U.S. (34%) or urban areas (34%) and parents (43%) were far more likely to compost at home. Nonetheless, these respondents do not show a significantly greater understanding of what compostable means or how to correctly dispose of these products.

The home composting market is growing with a compound annual growth rate of 8.6% from 2022 to 2030.[ix] As this market expands, BPI is working to develop the first home compostability certification in the U.S. In the absence of this type of certification, it remains unclear what certified compostable packaging can and cannot be composted in home compost bins and piles.

As previously noted, certified industrial compostable packaging is designed to break down safely in a commercial composting facility. This means the packaging hasn’t been qualified for a home composting environment, which tends to have a lower temperature and require longer timeframes. While home composting can manage vegetative food scraps and yard trimmings, it is not well suited for meat and dairy, and is limited in the volume of packaging it will be able to handle. According to the U.S. Environmental Protection Agency (EPA), backyard composting piles typically do not achieve high enough temperatures to fully decompose certified industrial compostable foodservice ware and bags. As such, they recommend not adding certified industrial compostable packaging to home compost piles.[x] This underscores the importance of scaling and expanding curbside collection for certified industrial compostable packaging throughout the U.S.

Moreover, we are seeing an emergence in at-home, counter-top bins with the capacity to process food scraps. These nascent technologies provide an innovative solution for reducing food waste, but they do not technically produce compost, as they use dehydration and other mechanisms to transform and repurpose food scraps. The microbial decomposition of composting takes several weeks or months to occur and cannot be achieved in just a few hours inside of a counter-top bin.

FIGURE 16. WHAT RESPONDENTS SAID THEY PUT IN THEIR HOME COMPOST BINS OR PILES



SOLUTION 1

Educating the U.S. population on what packaging should be placed in the recycling bin and industrial organics bin is critical to ensuring the success of clean material streams in both recovery systems.

Brands that have set ambitious sustainability goals to have all packaging be reusable, recyclable or compostable are directly impacted by inadequate collection and processing of both conventional plastic and compostable packaging. Incorrect disposal limits the potential volume of materials that could otherwise be captured in the recycling stream, and similarly limits the viability of the composting stream.

As we’ve uncovered in this report, irrespective of age, ethnicity, socioeconomic status, gender or where one resides: a significant portion of consumers do not understand what to do with compostable packaging after use. Nearly 30% of U.S. respondents would place it in the recycling bin.

SOLUTION 2

Municipalities and local governments with zero waste targets can help bridge this comprehension gap by partnering with brands on educational campaigns to encourage new social norms and sustainable behavior.

Many states, cities and municipalities have set ambitious zero-waste and food waste diversion targets for their communities. Leveraging their products as a platform for education, brands have an important role to play in helping advance these goals by educating consumers and streamlining messaging across city and state lines. This collaboration can spark new, best practices in communication.

Municipalities and brands can collaborate on educational campaigns to help residents understand their role in helping keep materials in use and out of the environment, inspiring new social norms. Research has shown that social pressure often has the greatest effect on behavioral change, since we judge our own behaviors based off one another. That same research indicates we are also more likely to adopt sustainable behaviors when learning from those in our immediate networks and communities.[xi] By working together, brands and municipalities can leverage their respective resources, knowledge and influence to achieve their shared goals of reducing waste and promoting sustainable practices.

SOLUTION 3

As the market for home composting continues to grow, home composting certification standards can help distinguish items that have been specifically designed and tested for home compost bins and piles.

As the market is flooded with new technologies and packaging that claim to be home compostable, educating consumers about the dos and don'ts of home composting becomes increasingly important to prevent contamination risks.

Collaborate Across the Value Chain

COLLABORATION CHALLENGES

CHALLENGE 1

A disjointed approach with local and state level policies and regulations that govern packaging design and labeling creates unnecessary friction and pain points for consumers, brands and composters.

Concerns about contamination in both recycling and composting streams have spurred five U.S. states to enact labeling laws that dictate labeling and design of compostable packaging, including California, Colorado, Maryland, Minnesota and Washington. However, a successful national policy framework requires harmonization across compostable packaging and products, including use of specific colors, design motifs and qualifying language.

Brands curate their products for nations, not states. Labeling policies that differ on a state-by-state basis often make compliance expensive and counter-productive, if not impossible. Policymakers making recommendations on how to design compostable packaging who consult with those who work upstream (brands) and downstream (composters) can develop a harmonized approach to labeling compostable packaging.

Learn more about our labeling policy recommendations here.

SOLUTION 1

Policymakers, brands and retailers can work together to harmonize the policies, regulations and design of compostable packaging nationally so it works for brands across several sectors and packaging of all shapes and sizes.

State laws need to be backed by data to support such propositions; otherwise, these regulations may be perceived as restrictive and unnecessary. To create productive legislation, policymakers, brands, manufacturers, converters and composters need to work together to share both insights and pain points.

Because implementing changes in packaging design requires significant financial investment and time, it is essential to understand the feasibility of adopting new techniques across different product categories, such as those outlined by the BPI Guidelines. If compostable packaging is to be cost competitive with conventional plastics, the industry must reconcile the added costs associated with these materials.

Looking Ahead

The future of the composting industry is at an inflection point. To realize the potential of commercial composting systems to handle significant volumes of food waste and compostable packaging, there is a pressing need to restructure economic incentives, align policies with infrastructure development, expand access to composting and foster new consumption habits.

This ambitious undertaking requires a cohesive effort to unify fragmented stakeholders towards a common goal of achieving a circular economy. Through the development of our forthcoming Investment Roadmap, the Composting Consortium is actively working to address organics infrastructure gaps in the U.S. and identify optimal sources of capital to spur the growth of the composting industry.

This research highlights findings in packaging design and labeling that can guide immediate action from packaging brands, manufacturers and converters. But there's more to be done.

Achieving this future state will require creativity and innovation from packaging manufacturers, designers and brands. It will also require a thoughtful approach to consumer education, and significant investment into better processing and sortation equipment and technology for composters at scale.

The path towards successful recovery of compostable packaging requires action from packaging brands, manufacturers and converters to create impactful design and labeling. As we move forward, it will be crucial to conduct observational or behavioral studies to better understand how consumers engage with compostable products and packaging in real-world scenarios. By continuously refining our understanding of consumer behavior and preferences, in parallel to infrastructure investment and effective policymaking, we can make meaningful progress towards advancing a circular economy.

Our research pinpoints three actions—design, educate and collaborate—that can help improve the diversion of food-contact, certified compostable packaging to the correct material stream. While this is a step in the right direction, the infrastructure and collection must be in place to collect and easily sort these materials so they end up in the right streams and reach the correct downstream processor.
This consumer insights study is a stepping stone for the industry, and just one element within the Composting Consortium's broader scope of work aimed at enhancing and scaling the composting industry, diverting food scraps from landfill and guiding the optimal approach to achieve circular outcomes for compostable packaging.

End Notes

i. Packaging Machinery Manufacturers, Ameripen, Packaging Compass: Evaluating Trends in U.S. Packaging Design Over the Next Decade and Implications for the Future of a Circular Packaging System

ii. Biodegradable Products Institute, Guidelines for the Labeling and Identification of Compostable Products and Packaging

iii. Closed Loop Partners, Navigating Plastic Alternatives in a Circular Economy

iv. National Ocean Service, What Are Microplastics?

v. Biodegradable Products Institute, https://bpiworld.org/certification

vi. Compost Manufacturing Alliance, https://compostmanufacturingalliance.com/cma-field-testing/

vii. Closed Loop Partners, Navigating Plastic Alternatives in a Circular Economy

viii. BioCycle, BioCycle Launches 2023 Food Waste Data Updates.

ix. Grand View Research, U.S. Residential Organic Compost Market Size, Share & Trends Analysis Report By Distribution Channel (Online, Offline), By Region, And Segment Forecasts, 2022 - 2030.

x. U.S. Environmental Protection Agency, Composting At Home

xi. Scientific American, What Makes People Act on Climate Change, according to Behavioral Science

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