Plastics Guide for Floral Industry *Wholesalers*

Sustainabloom™
by the American Floral Endowment

*Part of the American Floral Endowment's **Sustainabloom** Program*

Why Care About Plastics?

The surge in plastic production in recent years has resulted in a substantial accumulation of non-recyclable plastic waste. These plastics have the potential to accumulate within landfills, soil, water ecosystems, and impact the biological systems of animals and plants (National Science Foundation, 2021). Because of its chemical structure, a single plastic item can take hundreds to thousands of years to break down completely. As it breaks down, chemicals like additives and stabilizers from the manufacturing process are released, which harm the natural environment around it (Soulliere-Chieppo, 2020). One estimate places nearly 98% of plastic pots in landfills at the end of their life cycle (Nambuthiri et al., 2015).

Where to Start

So, what can be done about plastic use and consumption? Blanke (2023) recommends a four "R" approach for a sustainability assessment of plastics use in horticulture:

- **Reduce:** based on plastic type with considerations for density and longevity;
- **Reuse:** reduce single-use plastics and find ways for repeated use;
- **Recycle:** track plastic retrieval rates and increase the chance of recycling; and
- **Replace:** find plastic alternatives for the same purpose.

Common Recycle Codes

Plastics are categorized at recycling facilities by standardized codes to identify the materials used to create the product. Check with your local facility to see which categories are accepted. Common horticultural plastics include:

- #2: High-Density Polyethylene (HDPE)
  - Large nursery containers
  - Irrigation piping
- #4: Low Density Polyethylene (LDPE)
  - Mulching
  - Greenhouse cover
- #5: Polypropylene (PP)
  - Plant containers
- #6: High Impact Polystyrene (HIPS)
  - Flat trays, carrier trays, plug/propagation trays, shuttle trays

HDPE

Guide For:

- ○ Growers
- ✓ Wholesalers
- ○ Retailers / Florists
- ○ Transporters
- ○ Suppliers

PLASTICS AT A GLANCE

Plastic appears in every phase of the horticultural lifecycle, from seed packaging, planting, propagation, and mulching to irrigation, harvesting, packing, and preservation (Patel & Tandel, 2017). In floristry, plastics are used to sleeve bouquets and bunches, as design containers and potted containers, and in the growing process.

MEASURING PLASTIC USE IN THE FLORICULTURE INDUSTRY

Comprehensive data on the overall plastic usage in horticulture is difficult to find. The Food and Agricultural Organization estimates global crop and livestock production consumes approximately 10 million tons of plastic each year. In the United States, the ornamental horticulture sector's plastic consumption is 830,000 tons annually (Nambuthiri et al., 2015).

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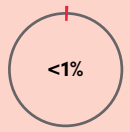
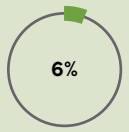
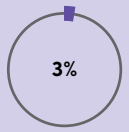
THE 7 TYPES OF PLASTICS

THEIR TOXICITY AND WHAT THEY ARE MOST COMMONLY USED FOR

POLYMER NAME	POLYETHYLENE TEREPHTHALATE	HIGH-DENSITY POLYETHYLENE	POLYVINYL CHLORIDE	LOW-DENSITY POLYETHYLENE	POLYETHYLENE	POLYSTYRENE	ALL OTHER PLASTICS Including, acrylic, fiberglass, nylon, polycarbonate, & polyactic acid (a bioplastic)
Resin Identification Code							
Abbreviation	PET or PETE	HDPE	PVC	LDPE	PP	PS	OTHER
Recyclable?	Commonly Recycled	Commonly Recycled	Sometimes Recycled	Sometimes Recycled	Occasionally Recycled	Commonly Recycled (difficult to do)	Difficult to Recycle
Percentage Recycled Annually							
How Long to Decompose Under Perfect Conditions	**5-10 Years**	**100 Years**	**Never**	**500-1,000 Years**	**20-30 Years**	**50 Years**	Majority of these plastics: **Never** Polyactic acid: **6 months**
Maximum Temperature	**70°C** (158°F)	**120°C** (248°F)	**70°C** (158°F)	**80°C** (176°F)	**135°C** (275°F)	**90°C** (194°F)	Plycarbonate: **135°C** (275°F) Polyactic acid: **150°C** (302°F)
Brittleness Temperature	**-40°C** (-40°F)	**-100°C** (-148°F)	**-30°C** (-22°F)	**-100°C** (-148°F)	**0°C** (32°F)	**-20°C** (-4°F)	Plycarbonate: **-135°C** (-211°F) Polyactic acid: **60°C** (140°F)
Toxicity Level	**HIGH**	**LOW**	**HIGH**	**LOW**	**LOW**	**HIGH**	**HIGH**
Most Commonly Leached Toxin(s)	Antimony Oxide, Bromine, Diazomethane, Lead Oxide, Nickel Ethylene Oxide, & Benzene	Chromium Oxide, Benzoyl Peroxide, Hexane, & Cyclohexane	Benzene, Carbon Tetrachloride, 1,2-Dichloroethane, Phthalates, Ethylene Oxide, Lead Chromate, Methyl Acrylate, Methanol, Phthalic Anhydride, Tetrahydrofuran, & Tribasic Lead Sulfate, Mercury, Cadmium, Bisphenol A (BPA)	Benzene, Chromium Oxide, Cumene Hydroperoxide, & Tert-butyl Hydroperoxide	Methanol, 2,6-di-tert-Butyl-4-Methyl Phenol, & Nickel Dibutyl Dithiocarbamate	Styrene, Ethylbenzene, Benzene, Ethylene, Carbon Tetrachloride, Polyvinyl Alchol, Antimony Oxide, & Tert-butyl Hydroperoxide, Bensoquinone	BPS, BPS, as well as other toxins mentioned
Floral Uses	Clamshells (boutonniere or food grade)	Non-food grade 5-gallon buckets, Heavy poly bags (i.e., bags in which stones come in), nursery and greenhouse pots*, soap dispenser containers*		Plastic sleeves, grocery style shopping bags, and food grade 5-gallon buckets, plastic wrap, trash bags	Candy and chocolate packaging, Clear adhesive tape, plastic storage boxes, greenhouse and greenhouse pots*	Nursery and greenhouse pots*, packing materials (i.e., peanuts) from container and delicate florals boxes, plastic utensils, cardholders, storage containers, brush and broom handles, soap dispenser containers*, cleaning supplies containers*	Many types of design bowls*, acrylics, cleaning supplies containers*

*If you're not sure which category of plastic type your item fits into, check on the bottom of the item for the triangle with the number inside, or the box that the item came in. The distributor has to label what type of plastic the item is on packaging.

1 POLYETHYLENE TEREPHTHALATE (PET OR PETE)

COMMONLY USED FOR

- Water Bottles
- Peanut Butter Jars
- Rope
- Caps
- Combs

CAN BE RECYCLED INTO

PET is commonly recycled, although it should not be reused

- Fleece Garments
- Carpets
- Storage Containers
- Stuffing for Pillows, Winter Jackets, & Sleeping Bags

2 HIGH-DENSITY POLYETHYLENE (HDPE)

COMMONLY USED FOR

- Shampoo Bottles
- Grocery Bags
- Milk Jugs
- Toys
- Park Benches

CAN BE RECYCLED INTO

HDPE is the most commonly recycled plastic and can also be reused

- Plastic Bottles & Jugs
- Outdoor Furniture
- Playground Equipment
- Fencing
- Ropes
- Toys

3 POLYVINYL CHLORIDE (PVC)

COMMONLY USED FOR

- Cleaning Products
- Sheetings
- Garden Hoses
- Credit Cards
- Window & Door Frames

CAN BE RECYCLED INTO

Almost all products using PVC requite virgin material for their construction

- Flooring
- Traffic Cones
- Credit Cards
- Paneling

4 LOW-DENSITY POLYETHYLENE (LDPE)

COMMONLY USED FOR

- Bread Bags
- Plastic Films
- Garbage Bags
- Hot & Cold Beverage Cups
- Food Storage Containers

CAN BE RECYCLED INTO

LDPE is difficult to recycle, although more plastic recycling programs are gearing up to handle this material

- Plastic Lumber
- Compost Bins
- Trash Cans
- Floor Tiles

5 POLYETHYLENE (PP)

COMMONLY USED FOR

- Yogurt Cups
- Straws
- Hangers
- Potato Chip Bags
- Prescription Bottles

CAN BE RECYCLED INTO

PP is one of the least recycled plastics & a majority of it ends up in landfills

- Shipping Pallets
- Brooms
- Shovels
- Watering Cans
- Cutting Boards

6 POLYSTYRENE (PS)

COMMONLY USED FOR

- Take-Away & Hard Packaging
- Toys
- Plastic Cutlery
- Foam Packaging

CAN BE RECYCLED INTO

Recycling is not widely available for polystyrene

- Egg Cartons
- Picture Frames
- Moldings
- Home Décor Products

7 ALL OTHER PLASTICS

COMMONLY USED FOR

- Baby Bottles
- Nylon
- CDs
- Eyeglasses
- Multiple-gallon Water Bottles

CAN BE RECYCLED INTO

Items made from #7 plastics are a combination of various plastics and are difficult to recycle. Products marked #7 with "PLA" cannot be recycled but can be composted.

Plastic Certifications for Floriculture Products

Plastic is a versatile and durable material that can be used for various purposes in floriculture. However, not all plastics are created equal and can have negative impacts on the environment and human health. To mitigate these negative impacts, producers and consumers should look for plastic products that have been certified by reputable organizations. These certifications can vouch for the plastic products' environmental quality and safety. This section will include four main categories of plastic certifications that are relevant for floriculture plastic products: recycled content, bio-based, biodegradable or compostable, and sustainability.

- **Recycled Content:** Recycled content certificates work to verify the percentage of a product made from recycled content or recycled materials. An example is the Recycling Content certification by SCS Global Services, which verifies that a product was made from recycled content or recycled materials. This certification is for product manufacturers and can include post-consumer or pre-consumer recycled content.
- **Bio-Based Certifications:** Bio-based products encompass items made wholly or significantly from renewable agricultural, chemical, and forestry materials sourced from plants or other renewable resources. An example is the USDA's BioPreferred Program which verifies the amount of renewable bio-based materials by comparing plant-based carbon to fossil fuel-based organic carbon in the material.
- **Biodegradable or Compostable Certifications:** These certifications can validate that the product has been independently tested and verified to meet set compostable standards. An example is certification from the Biodegradable Products Institute (BPI) which confirms that the material meets the criteria for being biodegradable or compostable in the right environment.
- **Sustainability Certification:** Sustainability certifications primarily focus on assessing how well organizations incorporate sustainable practices. When it comes to plastics, these standards examine aspects such as energy consumption, waste management (including processing, separation, and reduction), and other relevant factors. One example is the MPS-ABC certification, which can evaluate whether a minimum of 95% of the plastic and plastic waste undergoes reuse or recycling.

Innovation in Plastics

Industry Spotlight: Mayesh Wholesale Florist

As a national wholesaler focused on floristry educational initiatives, Mayesh put sustainability at the top of its educational pillars for 2023. Among the efforts – plastics reduction.

“Plastics, in particular, are tricky,” says Pat Dahlson, CEO of Mayesh. “We are really trying to move away from them where we can.”

Mayesh started working with flower growers in Ecuador to remove plastic sleeves and replace them with cardboard. In addition, once the flowers are in the United States, they are traditionally re-sleeved from one type of plastic to another. Instead of using more plastic and more labor to re-sleeve, Mayesh has started encouraging replacements such as butcher-block paper, craft paper, and newsprint, which works particularly well for summer flowers.

“As a bonus, we are also seeing quality improvement with these changes from plastic to paper, because of the limited amount of free moisture,” Dahlson says.

Several of Mayesh’s 22 branches throughout the country offer floral bucket exchanges, where Dahlson says, “they are reused until they break.”

He points to European initiatives to ban single-use plastic, which could shift the global floral industry in that direction.

“Here in the United States, too, I’d like to see our industry drastically reduce our reliance on single-use plastics,” Pat Dahlson. “An industry-wide call-to-action could be reducing single-use plastics by 50 percent.”

Dahlson has noticed that new entrants to the floral sector are both educated and looking to make a difference in the world, and many young employees want to boost sustainability efforts.

“We need to look like a company that can meet people where they want to be met,” Dahlson says. “We care, it’s socially responsible, and it’s smart business.”

Learn More at https://blog.mayesh.com/tag/sustainability

Biodegradable/ Compostable Sleeves

Plastic sleeves are often relied on to preserve the quality and presentation of flowers for consumers. They are commonly made from polyethylene terephthalate (PET #1), low-density polyethene (LDPE #4), or polypropylene (PP #5)*.

For those looking for more sustainable alternatives, biodegradable and compostable sleeves offer many advantages. This includes cost efficiency, meeting increased consumer demand, and reducing environmental impact. While plastic may seem cost-effective upfront, sustainable options provide long-term benefits by reducing waste and its associated costs, reducing logistics costs in storage, transportation, and shipping, and providing insurance against potential environmental regulations.

One example of a biodegradable alternative is paper sleeves. A recent assessment comparing various sleeve materials – including polypropylene (PP), low-density polyethene (LDPE), and paper – revealed that paper sleeves are the most sustainable choice (Royal FloraHolland, 2023). For those looking to enhance the sustainability of their sleeves, consider transitioning paper sleeves, incorporating more recyclable materials, and minimizing practices that hinder recycling, such as printing on the sleeve. Printing, while useful for branding, can have harmful environmental consequences and act as a contaminant in the recycling process (Royal FloraHolland, 2023).

*To identify the type of plastic used, look for indicators on the packaging specifying the recycling code.

Compostable Plastics

Compostable plastic, as defined by the International Organization for Standardization standards, is plastic that can degrade into carbon dioxide, water, inorganic compounds, and biomass and leave no toxic residue. What sets compostable plastic apart is its accelerated rate of decomposition compared to biodegradable plastics, particularly under specific environmental conditions that foster its breakdown. These conditions are typically met within controlled settings such as industrial composting facilities, where factors like regulated temperatures, humidity, and microbial activity help facilitate the composition. It's important to recognize that 'compostable' falls under the broader category of biodegradable, but the reverse is not always true. In other words, while compostable plastic is always biodegradable, not all biodegradable plastics are compostable. This is because not all biodegradable plastics meet the criteria for compostability. Some biodegradable plastics do not exhibit the same degradation rate as other compostable plastics or guarantee the absence of toxic residue.

To identify compostable plastics, one can search for indicators like the "#7 PLA" symbol on the plastic item, the explicit labeling of "compostable," or certification from authoritative bodies such as the Biodegradable Products Institute (BPI).

1

STARCH-BASED COMPOSTABLE PLASTICS

These plastics are derived from starches such as maize, wheat, potato, and cassava. One example is Thermoplastic Starch (TPS), which is crafted from corn starch and glycerol. TPS is used as a substitute for traditional plastic mulch and also as an alternative to petroleum-based packaging (Bangar, 2021).

2

CELLULOSE-BASED COMPOSTABLE PLASTICS

Cellulose-based plastics originate from plant cell walls found in biomass materials like trees, cotton, hemp, and wood pulp. For example, Cellulose Acetate (CA), is water-resistant and well-suited for packaging applications (Kinhal, n.d).

3

BACTERIA-BASED COMPOSTABLE PLASTICS

These plastics are produced through bacterial fermentation, including Polyhydroxyalkanoate (PHA). PHA's attributes such as resilience to UV rays, stiffness, and insolubility in water (Sharma et al., 2020) make it suitable in packaging and containers as a replacement for polyethylene and polystyrene (Lee, 1996).

4

FOSSIL FUEL-BASED COMPOSTABLE PLASTICS

This type of plastic can exhibit characteristics like toughness and resistance to moisture and gases, making it suitable for various applications including wrapping films, packaging, shopping bags, mulch films, greenhouse films, and silage covers (Europlas, n.d).

References

East Jordan Plastics' 150,000-square-foot recycling facility in South Haven, Michigan can process polypropylene and polystyrene – both commonly used for horticultural containers with limited recycling options – and the company makes 100 percent recyclable plant trays, pots, and containers. Learn more about their closed-loop plastics recycling efforts. https://www.greenhousemag.com/form/why-plastic-recycling-is-vital-for-horticultural-sustainability/

Read about the global use of plastics in agriculture in the Food and Agriculture Organization's Assessment of Agricultural Plastics and Their Sustainability. https://www.fao.org/3/cb7856en/cb7856en.pdf

Learn More

SCAN ME!

Sustainabloom™ by the American Floral Endowment

Sustainabloom is an industry-wide program created by the American Floral Endowment to provide easy-to-use resources and educational guides around key areas of sustainability, including plastics use, composting, substrates, carbon accounting, and much more.

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