ReFresh Nebraska
Stop the Rot
Fall 2021

Emerging Issues in Food Waste Management: Plastic Contamination

As we've discussed in past issues of ReFresh, EPA is actively working to cut food waste in half by 2030. To help meet this goal, they encourage diversion of food waste from landfills to composting and anaerobic digestion facilities that reduce methane emissions and recover value from it. However, stakeholders have raised concerns about the presence of plastic in food waste streams. Following is a summary of the issue, and the research needed to address it.

To achieve the environmental benefits of diverting food waste from landfills on a large scale, EPA must better understand the potential risks, to human health and the environment, of applying plastic-contaminated compost or digestate products to land, and the most effective strategies to prevent or mitigate these risks, and communicate these findings to affected stakeholders.

The primary source of plastic contamination in food waste streams, collected for processing at compost and anaerobic digestion facilities, appears to be food packaging and containers, most likely from residential, commercial, and institutional sources. Food itself is also a source of microplastic particles. The level of plastic contamination present in food waste streams is not well characterized in the scientific literature. A recent analysis found approximately 300,000 pieces of microplastics per kilogram of food waste collected from grocery stores in the United States. In addition, limited data from Washington State and Oregon, reports plastic contamination rates up to 2.8 percent (by weight) in mixed waste streams, including food waste that were destined for composting or anaerobic digestion. Plastic contamination rates in purely food waste streams may be higher, as available evidence indicates plastic contamination levels in food waste streams may be higher than that of other organics waste streams, such as yard waste.

Techniques to prevent plastic contamination in food waste streams, such as education and outreach, cart tagging programs, and hauler contract provisions, are being used in some jurisdictions. Limited data on prevention programs shows mixed results. If successful, prevention could reduce the complexity and increase the desirability of processing food waste streams. Processing facilities also use a variety of approaches, such as manual picking, screens, and de-packaging technologies, to reduce the amount of plastic contamination in food waste streams before processing. These approaches can be costly and are not fully effective. Plastic material, including microplastic, has been repeatedly observed in finished products. Further, it is unclear to what extent technologies may inadvertently introduce microplastics or nanoplastics into the end products, by breaking down larger pieces of plastics.

Current tests for physical contaminants are labor intensive and costly, making it impractical to process large sample sizes in the laboratory. Tests commonly used in the United States do not account for contaminants less than 4 mm in size and thus may miss some microplastics (defined as plastic particles <5 millimeters [mm] in size in any one dimension). Also, compost is heterogenous in nature, and physical contamination levels can vary between different samples.

Much remains uncharacterized about the environmental fate of, and exposure to, plastic particles in composts and digestates generated from food waste, and used as soil amendments, making it challenging to evaluate risks to human health and the environment. The available literature does not provide substantial evidence of environmental or human health effects that are occurring as a result of plastic contamination in finished compost and digestate products produced using food waste streams. It is also unclear how the risks associated with these products generated from food waste would compare to those of background levels of plastic contamination and other sources of plastic contamination in the environment, such as other soil amendments (synthetic or made from wastewater sludge and biosolids).

Owing in part to the uncertainty about environmental exposures and risks, regulations and standards, implemented to reduce the amount of plastic present in composts and digestates generated from food waste and used as soil amendments, vary by location. In the United States the federal government does not regulate plastic contamination in finished products applied to land; however, some U.S. states and international governments do. These limits vary in both the allowable levels of contamination and fragment size thresholds. Overall, the regulations in the United States typically do not address plastic fragments less than 4 mm, and regulations identified for other countries do not address sizes smaller than 1 mm. Limits may be set based upon detection levels, which vary along with the cost and level of complexity of available testing methods, and aesthetic concerns given that exposure and risk analysis is not available.

Regardless of risks to human health and the environment, the presence of visible plastic particles in finished products reduces their value and marketability. Processing facilities sometimes prohibit food waste streams, or reject incoming food waste streams collected for processing at compost and anaerobic digestion facilities, due to plastic contamination levels, thus reducing the amount of food waste diverted from landfills.

Plastic contamination may reduce the environmental and economic benefits of composting and anaerobic digestion of food waste. For example, an initial study indicated plastic contamination may impede the production of methane from food waste during anaerobic digestion, and another study found the presence of microplastics can alter greenhouse gas and ammonia emission levels during composting.

Compostable plastics present a unique set of operational challenges to both consumers and facilities seeking to compost these products when mixed with food waste. Compostable plastic materials can look similar to those made with conventional plastics, leading to contamination of the compostable food waste stream with conventional plastics, and to the removal of the compostable plastics, along with conventional plastics, during screening and de-packaging at processing facilities, eliminating the potential environmental benefit of compostable materials.

Plastic contamination in food waste streams and its implications for food waste management, and for human health and the environment, is an emerging issue in the early stages of investigation. Scientifically rigorous data are needed to address several important research gaps:

- Research to discover the level of plastic contamination and associated particle sizes (e.g., microplastics or nanoplastics) in finished composts and digestates generated from food waste and used as soil amendments in the United States.
- Research to ascertain the contribution of food waste to plastic contamination in compost and digestate used as soil amendments.
- Research to determine the impacts of technologies (e.g., shredders, grinders and de-packagers) commonly used by processors on the level of plastic contamination and size of plastic particles.
- Research to determine the effect of microplastic contamination on greenhouse gas and ammonia emissions levels during composting and methane yield from anaerobic digestion.
- Research to identify the most effective strategies to prevent plastic contamination in food waste streams.
- Research to assess exposure and the potential risks to human health and the environment from land application of plastic-contaminated compost and digestates.

Plastic contamination in food waste presents challenges for a broad range of stakeholders, including but not limited to those involved in waste management and processing facilities, and those who purchase and intend to use compost and digestate as soil amendments. Many key players contribute to the plastic contamination found in food waste streams, including packaging and food serviceware manufacturers, food processors, consumers, businesses, and institutions, and all of them can be a part of the solution.

For more information on Food Waste Research, go to www.epa.gov/land-research/food-waste-research

ReFresh Recipes

Shopping your fridge first is an important strategy for reducing food waste.
Here's a recipe idea that will help you use what you have before buying more!

PEACH SHORTCAKE WITH SHERRIED WHIPPED CREAM

TEACH AN OLD PEACH SOME NEW TRICKS

James Beard included this recipe in a menu for a summery, outdoor meal in his book, Menus for Entertaining.

USES UP
Peaches

MAKES
6 Servings

INGREDIENTS

- 2 cups flour
- 4 teaspoons baking powder
- 1/2 teaspoon salt
- 3 tablespoons sugar
- 4 tablespoons butter
- 3/4 to 1 cup heavy cream
- melted butter
- whipped cream
- sherry

DIRECTIONS

Sugar peaches to taste, and set aside. Sift flour, baking powder, salt and sugar together, then work butter and cream into the dry ingredients, using fingers or fork, to make a light dough. Roll or pat out 2/3 of the dough on a floured board to 1/2 inch in thickness and about 9 inches in diameter. Brush with melted butter, and place on a buttered baking sheet. Dot center with additional butter. Roll out the remaining dough a little thinner and to about 7 inches in diameter. Place the smaller round on the large, and brush with butter.

Bake at 425ºF for 15 to 18 minutes, or until nicely browned. Remove from oven. Separate layers. Arrange sugared peaches on lower layer, top with remaining layer, and decorate with more peaches. Serve at once with heavy cream or whipped cream flavored with sherry.

CREDIT: James Beard, Author and Educator Recipe courtesy of the James Beard Foundation.

FOOD STORAGE TIPS FROM SAVETHEFOOD.COM

RADISHES

REFRIGERATE IT: Yes **AT FRESHEST:** Radishes, 1 to 2 weeks; radish greens, 2 to 3 days

OPTIMAL STORAGE: Do not wash until ready to use. Separate green tops from radishes (otherwise the greens will draw out moisture). Store radishes in a breathable bag in the high-humidity drawer of the refrigerator, and store the greens as you would other dark greens.

FREEZING: Not recommended.

USE IT UP/REVIVAL: Radish greens are edible and can be eaten in salad or cooked. Peeling radishes is not necessary, but can give them a less peppery taste.

SQUASH, SUMMER

REFRIGERATE IT: Yes **AT FRESHEST:** 5 days

OPTIMAL STORAGE: Do not wash until ready to use. Store in a breathable bag in the high-humidity drawer of the refrigerator. Wrap cut ends with damp cloth. Handle carefully, as bruising can reduce vitamin content.

FREEZING: Wash, chop, blanch, immerse in ice water, drain, dry, and then place in an airtight container. Or shred raw zucchini and place in an airtight container.

USE IT UP/REVIVAL: Peel or cut away any damaged flesh, and serve as usual.

Slightly overripe squash are best served cooked. Grate overgrown squash or squash that has started to go so) for use in baked goods such as muffins and breads. Note that the grated squash can be frozen. Summer squash can be substituted for pickles in some pickling recipes.

SQUASH, WINTER

REFRIGERATE IT: No **AT FRESHEST:** At 55ºF/13ºC—Acorn, 1 month; pumpkin and butternut, 2 to 3 months; Hubbard, 3 to 6 months. Life may be somewhat shorter if stored on the counter at room temperature

OPTIMAL STORAGE: Store unwrapped in a cool, dark, dry, well-ventilated place (they keep best at around 55ºF/13ºC).

FREEZING: Cook until soft, remove rind, and mash. Allow to cool, then place in an airtight container and freeze. USE IT UP/REVIVAL: The skins of most winter squash, including butternut and acorn squash, are edible when cooked.

The seeds of winter squash are also edible and can be toasted just as you would pumpkin seeds. The skins can be used to make an edible container for other dishes—fill with desired filling, then bake and serve. Make squash "chips" in the oven. Slice very thin using a mandoline or peeler, toss with olive oil and salt, and bake at 400ºF/200ºC until the chips are curling but not browned, 20 to 35 minutes. Cool for 10 minutes—they will crisp the way cookies do after coming out of oven.

To download the entire Food Storage Guide, go to:
www.savethefood.com/food-storage

Quick Tricks! Brought To You By:
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QUICK TRICKS

How to Store and Prepare Fresh Fruits and Vegetables to Prevent Food Waste

Alice Henneman, MS, RDN Extension Educator

About 90 billion pounds of edible food goes uneaten each year in the United States, costing consumers about $370 per person yearly. Tossed fruits ($45) and vegetables ($66) account for about 30% of this amount. Proper storage and preparation of fresh produce can help save money and better utilize the resources that go into producing food (land, water, energy).

Following are some methods for prolonging the life of fresh produce.

Produce Stored Outside the Refrigerator

Different fruits and vegetables require different temperature and humidity levels for proper storage. Some produce that tastes best stored at room temperature include: bananas, garlic, onions, potatoes, sweet potatoes, tomatoes and winter squash.

Store these fruits and vegetables in a clean, dry, well-ventilated place, away from direct sunlight and away from areas where meat is prepared. Protect potatoes from light to avoid greening. If there is just slight greening, cut away the green portions of the skin before cooking and eating.

Keep bananas a couple of days longer by storing them in the refrigerator after they have reached the desired degree of ripeness stored at room temperature. The outside will turn brown, but they will still be light-colored on the inside. Another option is to buy bananas in varying degrees of ripeness so they don't all ripen at the same time.

For more waste reducing tips, go to:
www.food.unl.edu/cook-it-quick-documents/makeover-your-leftovers.pdf

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