



What to do with plastics

Plant growers, retailers, plastic manufacturers and recyclers consider new tactics for the recycling and disposal of plastics, as concerns mount over landfills and fuel

BY PETER SZYMCZAK

HUNDREDS OF POUNDS of it are in every automobile, truck and tractor. It's made into millions of straws, utensils and to-go containers for use in the food industry, as well as the disposable, sanitary medical instruments used by doctors and nurses.

And it's everywhere in the greenhouse and nursery industry too, found in everything from drip tube irrigation systems to injection molded pots, trays, flats, poly film and durable polyethylene silage bags.

"When we started, very little was being done to recycle agricultural plastics," said Allen Jongsma of Agri-Plas, an agricultural recycler in Brooks, Oregon. "Most people didn't have a clue how much plastic waste there was."

According to a 2018 report by the

International Energy Agency, the production of plastics — the most familiar group of petrochemical products — has outpaced all other bulk materials (steel, aluminum and cement) two-fold since 2000. The United States and Europe are currently consuming 20 times as much plastic, and 10 times as much fertilizer (also made from petrochemicals) as developing economies such as India and Indonesia, underscoring the huge potential for growth in plastics use worldwide.

With more plastics in the environment every day and their growth showing no signs of slowing, new tactics are being considered to recycle plastics locally.

"A lot of new paper products actually start with plastics — seedling trays, styroblocks, and the way plant material is transported around," said John

Desmarteau, communications director at Agilyx, a plastics recycler in Tigard, Oregon. "What we want to do is put plastics back into its best use."

The concept seems simple: Set aside the stuff that can be chopped up, melted down and made back into useful stuff. The problem is, there's no single turnkey process, due in large part to all the different kinds of plastics currently in the field, with new ones being invented by material scientists every day.

Where do all the plastic go?

Up until about two years ago, most U.S. plastic waste was sent overseas to China, Vietnam, Thailand and other southeast Asian countries, where it was recycled, incinerated, buried under- ➤

ground or disposed underwater.¹

“We were sending over very contaminated loads of material, which limited what they could recover,” Desmarteau said. “They also paid more per pound than any domestic converters, so it didn’t promote domestic conversion technology.”

But the waste stream turned tide in January 2018, when China abruptly stopped buying our recyclable plastics, paper and other refuse. China determined that the high levels of contamination causing damage to its environment and public health, combined with the low cost of oil needed to make virgin plastic, made recycling and disposal no longer desirable or profitable.²

China’s ban, called “National Sword,” came down on Oregon particularly hard.³

As of February 2020, Agri-Plas had largely stopped taking in any more nursery pots, baling twine, drip tubing, pesticide containers, and other greenhouse plastics. The recycling facility, which has been in operation over 25 years, had a colossal backlog of plastics — Jongsma estimated it in excess of two million pounds — with no place to send the sorted, ground and ready-to-be-recycled material.

“Normally we send a load a day out of here,” said Jongsma, co-owner with his wife Dari. “Right now we’ve only got one order, and we don’t know when it’s turning around.”

Mechanical vs. chemical methods

The majority of waste plastics are processed mechanically — sorted into like material and ground into flakes, then melted into “beads” for reuse in the manufacture of new plastic items.

There are many downsides to this process. For starters, it takes much energy to sort, grind and transport the material, largely defeating the economical and ecological purposes of recycling in the

first place. In addition, plastics must be made from the same types of polymers and they must be very clean, free of dirt, plant debris or any chemical contaminants, or the recycling process won’t work.

“A nursery sends a stack of #1 gallon pots. There’s stuff made in Asia, there’s stuff made in the U.S., there’s some HD, there’s some injection, but they all look about the same, when in fact they’re all different. The industry really needs standardization,” Jongsma said. “It’s time to innovate and adapt.”

Jongsma has teamed up with chemist Kevin DeWhitt to build a machine that holds the promise of converting 20,000 to 25,000 pounds of plastics per day into usable fuel. At a conversion rate upwards of 75%, that’s 15,000 pounds of low-sulfur diesel fuel that could be sold back to farmers for powering tractors, possibly in the shipping industry. Carbon ash, a byproduct of the process, could be used as a soil amendment.

Similarly, Agilyx is also developing a chemical process that could prove revolutionary. The company, founded by DeWhitt in 2004, is racing to develop a scalable model for converting plastics — polystyrene, specifically — into fuel and feedstock for new plastic products.

“We found that polystyrene items

could create a new product that is a drop-in product for new polystyrene products,” said John Desmarteau, director of communications. “Now it’s less of an intermediate product that needs further refining.”

The new product promises up to 70% less greenhouse gas generation compared to virgin products.

“It’s indistinguishable from virgin material, and it can go back into the highest grades of sterile food service, medical items, plant trays and styroblocs,” Desmarteau said. “Our hope is to increase plastic recovery globally from 10% to 90%.”

It’s estimated that 359 metric tons of plastic were produced in 2018, equivalent to the mass of roughly two-thirds of the world’s population, with less than 10% of it actually recycled.⁴ The rest was disposed in landfills, burned in incinerators creating air pollution, or left uncollected.

Reducing waste

At Kraemer’s Nursery, a stockpile of plastic pots in various sizes had accumulated over the years. Maybe they’d be of use again some day ...

“Sometimes you just have to take a look and ask, ‘Are we ever going to use these?’ And if not, then we try to get it to recycling,” said Chris Ames, operations director.

Since joining Kraemer’s last year, Ames has overseen the reduction and organization of those piles after instituting a Lean initiative to improve efficiency at the 850-acre facility in Mt. Angel, Oregon.

“Before we basically just made piles of miscellaneous garbage plastic, stacked on top of each other, mixed in with garbage,” Ames said. “Now we basically have a base set up where containers get put in the same spot every time, garbage string all together.”



Kraemer's reuses as many pots, trays and flats as possible by sanitizing them in an onsite steam-sterilization facility to extend their lifetime. Ames is also actively looking to upgrade the propagation trays they use to get even more use out of them.

"They're expensive, but if we can get multiple uses then it makes sense," Ames said.

But those thicker trays, too, will eventually need to be disposed of. Traditionally, Agri-Plas has been where Kraemer's and many other Oregon nurseries have taken their spent plastics.

"We send everything that they'll take, but we're limited in how much we can send their way now," Ames said.

"We are a little stuck, looking for other recycling resources," echoed Mark Bigej, chief of operations at Al's Garden & Home, the state's largest independent nursery retailer. Al's has growing facilities in Hubbard, Mt. Angel and Gresham, where they grow 90% of the soft-stemmed annuals and perennials they sell at their retail locations.

"We try to use our flats as much as possible. Some of the gallon carrier trays we get years and years, but our 6-inch in gallons and 4-inch we only get one year," Bigej said.

Bigej said they try really hard not to send this material to landfills, but right now there's no good, consistent solution.

"Priority-wise, recycling is pretty high up there," he said. "We're such a great industry, but we are so dependent on plastics."

Profusion of petrochemicals

Domestic oil drilling by fracking (hydraulic fracturing) has surged since 2000, with Texas, Pennsylvania, Louisiana, Oklahoma and Ohio leading the way.⁵ Nationally, fracking produces approximately 50% of the oil and two-thirds of the natural gas used in the United States, according to the U.S. Energy Information Administration.

Fracking has not only made America less reliant on oil imports for its energy needs, it has also tapped into a new profitable resource. When natural gas comes out of the ground, it contains ethane — a key ingredient in the manufacture of plastics.⁶

America is producing so much ethane

that more than 300 new petrochemical and plastics plants are either planned or are under construction around the country.⁷ With more ethane than existing U.S. plants can use, the U.S. has also become the world's leading exporter of ethane, which has spurred the growth of plastics industries in India, China and Europe.⁸ U.S. exports of ethane are expected to keep growing and are on pace to double by 2040.

"Natural gas is practically free, which helps keep the price down," said Rick Anderson, president of Anderson Pots, a manufacturer of injection molded nursery pots, bands and flats made of polypropylene and high-density polyethylene.

About 10 years ago, Anderson introduced a line of biodegradable pots, but there was "absolutely no interest in them on the grower side. They were slightly more expensive, but people were worried they would not be as durable," Anderson said.

With abundant supplies of virgin petroleum and natural gas, there's less incentive to recycle — until now, as piles of plastic waste begin to build up.

"There's incentive to recycle in the Pacific Northwest because we're here, but there's no infrastructure," said Nicole Janssen, president of Denton Plastics in Gresham, Oregon. "It's the same all over the U.S. We need more processing facilities to handle the materials."

Recycling rules vary from state to state, depending on the recycling facility, and even year by year. "Check frequently with your recycler to see what their current requirements are," has become the recycling mantra.

Since 2014, Anderson Pots has tried to simplify the process by partnering with Denton Plastics to convert old plastic nursery containers and flats into new containers. Anderson offers credits toward future purchases of pots.

"We'll take whatever's ours or American made," Anderson said. "The main impediment is it has to be clean, no dirt or rocks. Making sure it is clean and reusable is the main problem."

Additionally, Denton Plastics recently received an Oregon Metro grant to install a new continuous melt filter on an existing

plastic extruder line.⁹ The new equipment will enable an estimated 6 to 8 million pounds of plastics to be processed.

A deposit on the future

Until technology catches up, new legislation is attempting to curb plastic consumption.

Fast on the heels of Oregon's single-use plastic bag tax and ban¹⁰ taking effect this year, the Break Free From Plastic Pollution Act of 2020¹¹ is new federal legislation, co-sponsored by Oregon Sen. Jeff Merkley and others, that seeks to phase out all single-use plastic products and hold corporations accountable for waste in an effort to reduce packaging and reform the waste and recycling collection system.

The proposed federal legislation is not expected to pass. Lacking a set of national standards, the problem of what to do with plastic waste is being sorted out by local recyclers like Agilyx and Agri-Plas.

"It's happening here in Oregon," said Desmarteau of Agilyx. "We're working on a process that can be replicated in other places across the nation. As much as there was doom and gloom over the last two years, more domestic converters coming online should help offset the losses of foreign entities willing to take on our waste." ©

Peter Szymczak is a freelance writer for Digger magazine. He can be reached at szymczak.peter.t@gmail.com

References:

- 1 <https://borgenproject.org/10-facts-about-plastic-waste-in-southeast-asia/>
- 2 <https://www.businessinsider.com/low-oil-prices-hurt-plastics-recycling-2016-4>
- 3 <https://99percentinvisible.org/episode/national-sword/>
- 4 <https://www.statista.com/statistics/282732/global-production-of-plastics-since-1950/>
- 5 <https://www.eia.gov/todayinenergy/detail.php?id=41955>
- 6 <https://www.npr.org/2019/11/13/778766554/ethane-and-the-plastics-boom>
- 7 https://www.americanchemistry.com/Shale_Gas_Fact_Sheet.aspx
- 8 <https://www.eia.gov/todayinenergy/detail.php?id=38232>
- 9 <https://www.oregonmetro.gov/2018-2019-investment-and-innovation-grants>
- 10 <https://www.oregon.gov/deq/mm/production/Pages/Bags.aspx>