Technical Resource

Considerations about biodegradable and compostable films #150

There is a growing segment in the industrial packaging market for VCI biofilms — plastics made from plant biomass, such as corn. In an increasingly sustainability-driven world populated by more conscious customers, this growing focus on plant-derived plastics should not be a surprise. In fact, the industry is booming, predicted to grow 50 percent by 2020 and possibly replace 90 percent of traditional fossil fuel-based plastics someday. However, as is often the case in the world of sustainability, there is more to this conversation than many customers are aware of.

While ARMOR thinks that bioplastics can be part of the solution, as of today, it doesn't seem to be the silver bullet everyone is making them out to be. Here are some of the descriptions you'll see on bioplastic products:

Bio-based: This refers to the product's beginnings, that it's been made with a renewable material of sort, such as corn, wheat, potato, coconut, wood, shrimp shells, etc. But only a small portion of the plastic may be renewable. To be called a bioplastic, a material only needs 20 percent of renewable material; the other 80 percent could be fossil fuel-based plastic resins and synthetic additives.

Biodegradable: This refers to the product's end-of-life and means that it will "break down completely in the natural environment through the action of naturally occurring microorganisms such as bacteria, fungi, and algae," although it makes no promises about not leaving questionable residues behind.

The assumption is that it will happen in within a single season, but a lot depends on where the item ends up. If it's the ocean, biodegradation may never take place. The true is that the biodegradability of bioplastics depends on temperature, polymer stability, and available oxygen content. Bottom line, at ambient conditions, a film buried in a landfill with no access to oxygen, will never fulfill its promise.

A sub-category is oxo-biodegradable plastics, a phrase often seen on grocery bags and a classic example of greenwashing: These are traditional fossil fuel-based plastics that have been combined with what are called transition metals -- for example, cobalt, manganese, and iron -- which cause fragmentation of plastic when triggered by UV radiation or heat. The additives make the plastic break down faster.

Degradable: The plastic is capable of breaking down into smaller pieces that will disseminate into the surrounding environment. This is meaningless, as all plastics will break down eventually, and this is not a good thing; bigger pieces are less easily mistaken as food by wildlife.

Compostable: The material will break down "at a rate consistent with other known, compostable materials and leaves no visually distinguishable or toxic residue." But for the vast majority of bioplastics, this requires an industrial composting facility, not a backyard composter.

The Problems with Biodegradable Bioplastics

Beyond all marketing promises, biodegradable bioplastics will only break down in a high-temperature industrial composting facility, not your average household compost bin. However, this important distinction is often not made clear to customers, who may mistakenly assume it will decompose in a

reasonable time frame in their compost piles. Without giving any further instruction, telling customers that these plastics are readily biodegradable is subjected to misleading.

This wouldn't be as much of a concern if we had a great composting infrastructure, but we don't. With only about 200 industrial composting facilities in the United States and 50 million tons of organic waste still ending up in landfills across the country each year, we are obviously ill-equipped to adequately compost any meaningful volumes of biodegradable plastic. In fact, many operational industrial composting facilities today won't even accept PLA (Poly Lactic Acid) and other biodegradable plastics since they are seen as contamination risks.

Moreover, biodegradable plastics don't make all that much sense in a long-term context either. Plastic is a complex, highly refined synthetic material — why create something that requires a significant amount of energy to manufacture, only to have it disappear forever into the soil? Of course, this assumes that the plastics will actually find their way to an industrial facility, which as we've pointed out, seems unlikely today.

While ARMOR believes we should be skeptical of biodegradable bioplastics, a better solution might be to start adopting durable bioplastics that are made from plant materials, but can still be recycled so those valuable energy and material inputs can be kept in the production cycle longer. It also makes far more sense to build a bio-based plastic that fits into our existing infrastructure, rather than building an entirely new biodegradable plastic composting infrastructure from scratch. Today, we currently do not have the land space available to grow more bioplastic feedstocks (sugarcane, corn, etc.) without cutting into farmland already used for food production. To make matters worse, bioplastic feedstocks can have a significant water footprint, and growing feedstocks like sugarcane could lead to more deforestation in tropical regions and countries like Brazil.

In fact, most people would toss these in recycling, which causes additional problems by contaminating the regular recycling stream. The biodegradable plastic can ruin a batch of recycled plastic, rendering it useless, and it all has to go to landfill.

Conclusion.
The environmental impact of bioplastics is often debated, as there are many different metrics for "greenness" (e.g., water use, energy use, deforestation, biodegradation, etc.) and tradeoffs often exist. The debate is also complicated by the fact that many different types of bioplastics exist, each with different environmental strengths and weaknesses, so not all bioplastics can be treated as equal. This is why, we shouldn't blindly accept the notion that a single use of film inscribed "made with corn" is somehow going to save our planet.

For additional information on ARMOR's full line of corrosion management products, visit www.armorvci.com or email info@armorvci.com.

Published by: Armor Protective Packaging® Technical Services, June 4th, 2018.