OPEN ACCESS Freely available online

Journal of Plant Biochemistry and Physiology: Open Access

Editorial

Polysaccharide-based Bio-Plastic Process in Plants

Peter Vagner*

Department for Research in Bioenergy, São Paulo State University, Sorocaba Brazil

ABOUT THE STUDY

Bioplastics are plastics that are made from renewable biomass sources such vegetable fats and oils, corn starch, straw, woodchips, sawdust, and recovered food waste, among others. Some bioplastics are made chemically from sugar derivatives (e.g. lactic acid) and lipids (oils and fats) from plants and animals, while others are made biologically from sugar or lipid fermentation. On the other hand, common plastics like fossil-fuel plastics (also known as petro-based polymers) are manufactured from petroleum or natural gas.

In 2014, bioplastics made up roughly 0.2 percent of the global polymer market. (300 million metric tonnes) Bioplastics are still being researched, despite the fact that they are not commercially feasible. Biodegradability is an advantage of several bioplastics. Some bioplastics disintegrate more slowly than petroleum-based polymers, and not all bioplastics are biodegradable.

The most extensively used bioplastic is thermoplastic starch, which accounts for more than half of the bioplastics market. A simple starch bioplastic film can be made at home using gelatinizing starch and solution casting. Pure starch can absorb moisture, making it an appropriate material for producing medicine capsules in the pharmaceutical business. Bioplastic made entirely of starch, on the other hand, is brittle. Plasticizers such as glycerol, glycol, and sorbitol can be added to starch to allow it to be thermoplastically treated. The properties of the resulting bioplastic (also known as "thermoplastic starch") can be modified to different applications by changing the quantities of these elements. Traditional polymer processing techniques such as extrusion, injection moulding, compression moulding, and solution casting can be used to convert starch into bioplastic. The ratio of amylose to amylopectin has a significant impact on the properties of starch bioplastics. Starch with high amylose content offers higher mechanical properties in general.

BASF blends starch/polylactic acid, starch/polycaprolactone, or starch/Ecoflex (polybutylene adipate-co-terephthalate) with biodegradable polyesters to create starch/polylactic acid, starch/polycaprolactone, or starch/Ecoflex (polybutylene adipate-co-terephthalate). These mixes are biodegradable and can be used in a variety of industrial settings. Roquette, for instance, has created its own starch/polyolefin blend. These blends have a reduced carbon footprint than petroleum-based polymers for equivalent applications, despite not being biodegradable. Starch is a low-cost, abundant, and renewable source of energy.

Biodegradable and compostable items made from starch and thermoplastic polyesters are known as starch-based films (often used for packaging). Consumer items packaging, such as magazine wrappers and bubble wrap, frequently use these films. Bakery or fruit and vegetable bags are frequent uses for these films in food packaging. Organic waste is collected deliberately using composting bags with these films. Starch-based films can also be used as a paper. Starch-based nano composites have been widely studied in terms of mechanical properties, thermal stability, moisture resistance, and gas barrier properties.

In nature, microorganisms digest sugar or lipids to produce polyhydroxyalkanoates, which are linear polyesters. They're made by bacteria to store carbon and energy. In industrial manufacturing, the polyester is recovered and purified from microorganisms by optimizing sugar fermentation conditions. More than 150 different monomers can be combined to make materials with a wide range of properties within this family. PHA is a biodegradable polymer that is less elastic and more ductile than other polymers. These plastics are extensively used in the medical industry.

Correspondence to: Dr. Peter Vagner, Department for Research in Bioenergy, São Paulo State University, Sorocaba Brazil, E-mail: vagnernjh@peter.br

Received: November 12, 2021; **Accepted**: November 26, 2021; **Published**: December 03, 2021

Citation: Vagner P (2021) Polysaccharide-based Bio-Plastic Process in Plants. J Plant Biochem Physiol. 9: e148.