Plastic waste is an environmental problem. Waste plastics have accumulated on the planet from as deep as 10,000m below sea level in Mariana's Trench to ocean and land surfaces to mountain tops. Currently, Canadians generate more plastic garbage than ever. Plastics, which are derived from fossil fuels, do not biodegrade. Some plastics are recyclable, but many are not, and so plastics will remain in the environment for hundreds of years. Plastics have been known to kill land and marine life and fill landfill sites. By 2050, the mass of plastics in the oceans is expected to outweigh the mass of marine life. Both land and sea animals are harmed by plastics; often, animals mistake plastics for food and they get caught and trapped in plastic items. One in three sea turtles have eaten plastic, which cannot be digested and fills the sea turtle's stomach (BBC, 2019).

One solution to Earth's plastics problem is the preparation and use of bioplastics. By definition, a bioplastic is not prepared from fossil fuels and it degrades within 12 weeks at 60°C (Kontopoulou, 2019).

Purpose

To engineer a bioplastic. After many attempts to make a plastic that was useful and did not crack, it was determined that the most successful preparation involved a potato starch plastic with a castor oil plasticizer. This plastic was determined to be clear, flexible, durable and strong. Possible applications of this plastic would be food wrappers (for fast food and for fresh produce), agricultural mulch, food preservation and liners for coffee cups. These applications were tested in the lab by preparing products such as food wrappers and coffee cups and by doing plant growth experiments, with and without various plastic mulches. The food wrappers and coffee cups were practical. The potato starch plastic with castor oil plasticizer prevented plant growth, suggesting that it would be effective in preventing the growth of weeds between rows of crops. The potato starch plastic with sunflower oil plasticizer enhanced plant growth, suggesting that it could be used as a slow-release fertilizing mulch.

https://www.bbc.co.uk/newsround/42810179

Kontopoulou, Marianna, Queen.s University, personal communication, 2019