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Bioplastics: A step towards carbon footprint reduction

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Plastic, one of the most utilised petroleum derivatives around the world has become a primary causative of a range of environmental issues over the past few decades. This is mainly as a result of the fact that petrochemical-based plastics are non-biodegradable and contaminating in nature. As an eco-friendly alternative, bioplastic, which is a type of biopolymer made from renewable resources, such as plants has been introduced. Bioplastics have different chemical compositions, mainly consisting of PLA (polylactic acid), PHA (polyhydroxyalkanoates), PBA (polybutyrate adipate terephthalate), PBS (polybutylene succinate) and PHB (poly hydroxybutyrate). PLA made from sugars extracted from plants, such as sugarcane is widely used for food packaging. PHA engineered from microorganisms is used mainly in medical devices. Biodegradability is the main criterion used to assess the environmental value of bioplastics. Some bioplastics are photodegradable and use heat and light to degrade while others produce carbon dioxide and water upon degradation by microorganisms. Both the positive and negative effects should be taken into consideration as bioplastic production can be more efficient than petrochemical-based plastic production in some aspects while being less efficient in others. Bioplastic production emits less amount of carbon to the atmosphere, which in turn helps to reduce the carbon footprint. The amount of carbon they return to the atmosphere is almost equal to the amount of carbon plants take up during growth. Bioplastic production consumes less energy and avoids the use of non-renewable raw materials. They help to reduce the amount of non-biodegradable waste and greenhouse gases that are released into the environment. Not only the crops used for biomass competes with food production, the fertilisers and pesticides used in the crops as well as chemicals used in chemical processing end up releasing more pollutants to the environment in comparison to petrochemical-based plastic production. Bioplastic production tends to be more expensive and contributes more towards ozone layer depletion. Therefore, alternative production processes should be evaluated in order to find solutions to these drawbacks. The use of seaweed as biomass is one of the alternatives that is currently being experimented on along with recycling of bioplastics. With current research and development efforts to improve the process and solve the issues involved, bioplastic will be a strong contender towards a sustainable future.

Keywords: Bioplastic, Biodegradability, Carbon footprint, Pollutants, Biomass crops

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