Agricultural Plastics: Recent Developments in Waste management and Recycling

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Synthetic plastics are used in farms as mulching materials and shade materials/greenhouse covering materials (shade nets and plastic films) to protect plants from pests and extreme weather [1]. The properties of plastic materials make them one of the main pollutants in ecosystems, primarily because of their propensity to break down into small particles, such as microplastics and nanoplastics, and because of the emission of some chemical substances due to ultraviolet radiation from the sun that are added during the manufacturing process (additives) to improve the properties of the plastic (such as biophenol). Unfortunately, the practice of dumping plastic waste is widespread, with marine ecosystems experiencing the greatest rates of dumping, which has an impact on their flora and fauna, as well as the microbiome that goes along with it, as well as their physical environment.

Most of the time, the lack of sustainability generated by conventional agricultural production processes violates the 1992 United Nations (UN) principles for *"Sustainable or Lasting Development."* In addition, the European Union (EU) recently reformed its waste management regulations, which affect the treatment of agricultural plastics (hazardous and non-hazardous) [2, 3]. These regulations emphasize the reuse of waste generated during manufacturing processes by transforming it into by-products.

The various management methods for this waste stream include *Landfilling Burning or burial onsite (legally and illegally), Waste-to-Energy Incineration, Re-Use and Recycling.* During the last years, due to new technology developments on biotechnology, additive manufacturing and data management, new methods have been developed on waste management and recycling of plastics.

Aim of this work is the presentation of latest research developments and trends of agricultural plastics waste management and recycling, focused mainly on enzyme/microbial decomposition of plastics [4], re-use through 3D/4D printing technics [5], geospatial mapping of agricultural plastics [6] and discuss also their environmental and economic benefits.

References

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