

PHA Production in Plants: Enabling a Sustainable Plastics Biorefinery.

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Abstract

Polyhydroxyalkanoates (PHAs) are a broad and versatile family of plastics, ranging in properties from rigid, strong and stiff to tough and highly elastomeric. They can be made as resins or aqueous dispersions with excellent film forming characteristics. Robust in use, yet biodegradable, PHAs offer a renewable and environmentally friendly alternative in many applications now served by synthetic plastics, including fibre, film, molded goods, extruded products, adhesives, and coatings. These materials can address unmet needs and ultimately replace a significant proportion of the 150 million tonnes of plastic produced today from petrochemical resources. PHAs are unique in the industrial biotechnology field in that they are produced as finished polymers in storage granule form as the result of known metabolic pathways inside living microbial cells. This has provided the basis to transfer these metabolic pathways into plants and develop an entirely new agricultural opportunity with markets solely in the industrial and energy sectors. Metabolix has developed a detailed biorefinery cost and engineering analysis using switchgrass (*Panicum virgatum*) which is being developed as an energy crop in the United States as a vehicle for very large-scale PHA manufacturing. Progress on advancing the production of PHAs in crop plants along with the overall environmental benefits of the switchgrass PHA biorefinery will be discussed.

Media Summary

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Key Words

Polyhydroxalkanoates, PHAs, plastic, switchgrass,