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Short Communication

Sustainable Food Packaging: An Insight

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Introduction

Replacement of Petrochemical based resources by biologically derived resources is of paramount importance and this trend leads to the evolution of the sustainability in packaging across industries and Government policies. This leads to the increasing interest being given to environmental concerns. For examples, plant-derived products and by-products obtained from their fermentation are one of the most interesting candidate for plastic packaging production.

At a large-scale level, there is a strong relevance in the use of bio-based materials as a tool to address the food industry needs, to control the production chain by overall reducing material wastes. For Example, edible, bio-based, and biodegradable materials acquired from renewable resources are driving ambitions to replace the packaging materials, coming from nonrenewable resources. This helps to finally achieve a more sustainable development of the packaging industry (refer the figure 1 below).

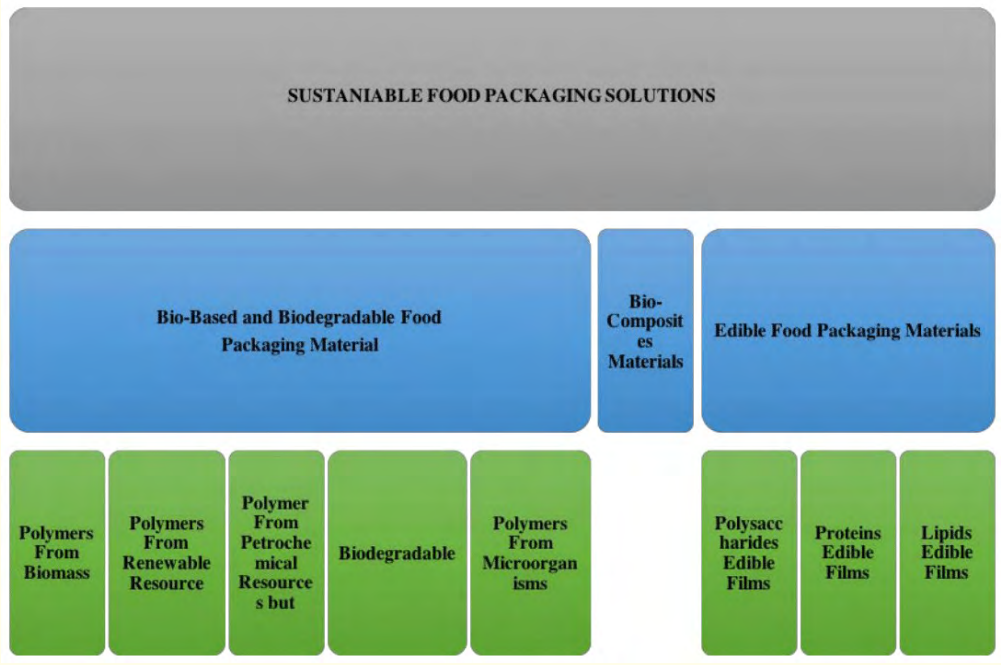

Figure 1: *Depicting the examples of the sustainable Packaging Solutions.*

Definition

The broader definition of sustainable packaging incorporates other environmental concepts such as recyclable packaging, reusable packaging, reducing carbon dioxide emissions, using less nonrenewable energy resources to produce packaging, and actually using less packaging overall.

In recent years, several definitions for sustainable packaging have been made. For example, the Sustainable Packaging Alliance (SPA) in Australia defines that sustainable packaging should meet the following four principles: packaging should be effective (both cost-effective and functional for all the users in the value chain), efficient (using material resources and energy as efficiently as possible), cyclic (enabling recovery through industrial or natural. Following figure depicts the same concept.

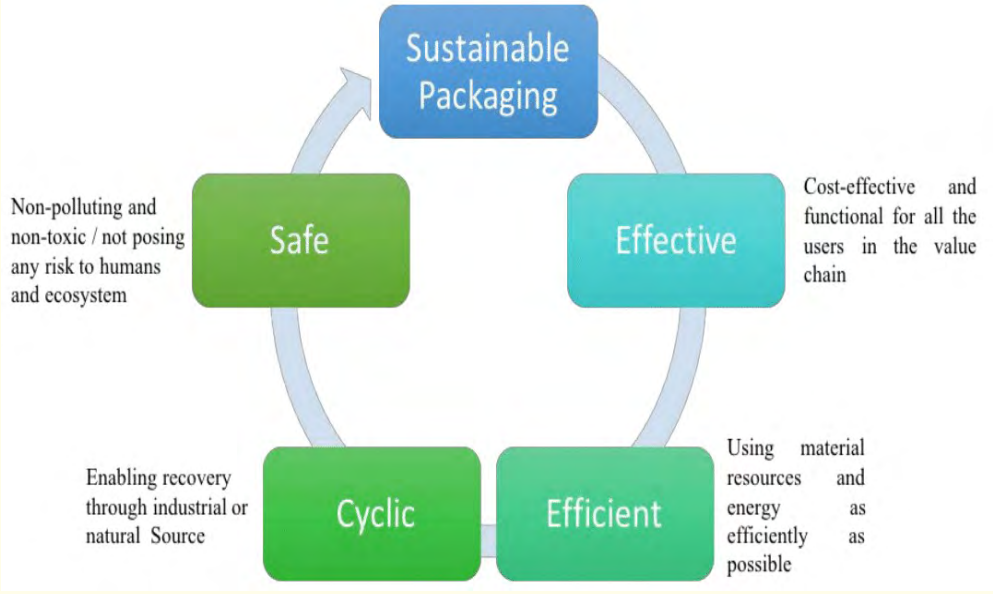

Figure 2: *Depicting the key elements of Sustainable Packaging.*

The Sustainable Packaging Coalition (SPC) in the USA [1] defines that sustainable packaging is beneficial, safe and healthy throughout its life cycle, meets market criteria for performance and cost, is based on renewable energy throughout its lifecycle, optimizes the use of renewable and recycled materials, is manufactured using clean production technologies and best practices, is made of materials healthy in all possible end of life scenarios, is physically designed to optimize materials and energy and is effectively recovered and utilized in biological and/or industrial closed loop cycles systems) and safe (as non-polluting and non-toxic and therefore not posing any risk to humans and ecosystem. Most of the definition still discuss about the concept of bioplastics use to drive the ambition of sustainable packaging. Since 2010, global production of the bioplastic is on rise. The trend is mentioned in the figure below. The rapid increase in the production of bioplastic suggest that importance of the sustainable packaging.

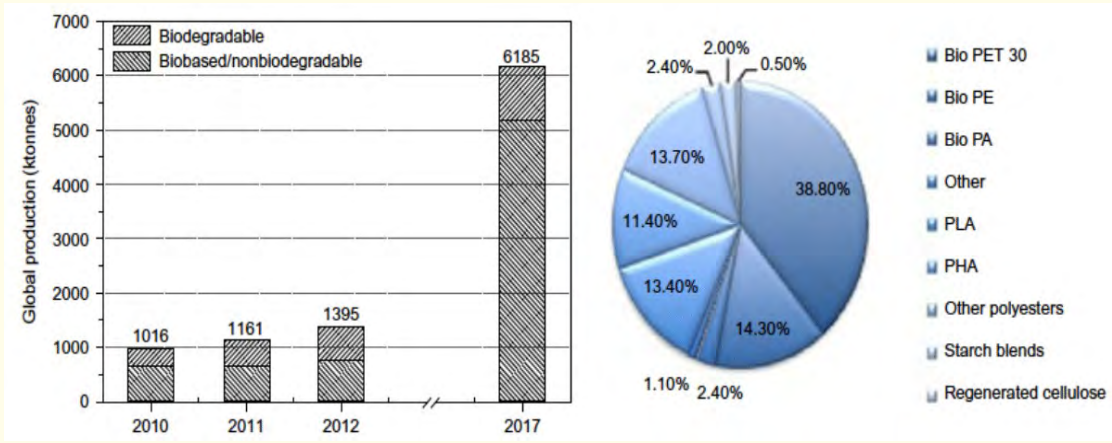

Figure 3: *Global production capacities of bioplastics (European Bioplastics, 2013) by material type. (Data from www. plasticeurope.org/ Sustainable Food Production from Agriculture to Industry).*

Companies involved in the Sustainable Packaging solutions

Globally companies have realized the importance of the sustainable food packaging. Table 1 defines the leading companies working in the area of biodegradable food packaging. Major retail chains in western Europe and North America are supporting the use of sustainable packaging, including the growing use of biodegradable packaging materials rather than conventional plastic packaging. They recognize that sustainable packaging presents an opportunity to differentiate their products and to present amore environment-friendly image to consumers.

Company, Country	Products and applications	Material/Source	Website
Biomass Packaging, USA	NatureFlex film for fresh food bags	Cellulose/ renewable wood pulp	http://www.biomasspackaging.com/brands/natureflex/
Amcor Flexibles, Australia	PLA film	PLA film/ Cornstarch	https://www.amcor.com/product-listing?k=
Bi-Ax International, Canada	Evlon®	PLA / Plants	http://www.biaxinc.com
Coopbox, Italy	Natural Box PLA lidding film and trays	PLA/ renewable feedstock	http://www.coopbox.it/portal/page?_pageid=896,6308636&_dad=portal&_schema=PORTAL
Cortec Corp., US	Eco Film and Eco Works film and bags /Export Packaging/ Garbage Bags	Biodegradable/	https://www.cortecvci.com/Products/single.php?code=10045
Europackaging, UK	PLA bags and film for fresh food	PLA	http://www.europackaging.co.uk
Biopac, U.K	PLA Tumblers/Straws	PLA /renewable cornstarch	http://www.biopac.co.uk/half-pint-i-am-not-a-plastic-cup-tumblers-ce-marked.html
M2 Formulex, Canada	Biodegradable cling film	Non-GMO raw materials	http://www.m2formulex.com
Mitsubishi Plastics, Japan	BioPBS™	(bio-based polybutylene succinate)	http://www.mcpp-global.com/en/asia/products/brand/biopbstm/
NNZ, Netherlands	Starch-based Okopack film and bags for fresh fruit and vegetables	Starch Based	https://www.nnz.com
Octopus Packaging, UK	PLA packaging film/Trays	PLA	http://www.octopuspackaging.co.uk/biocompostable.html
Organic Farm Foods, UK	Mater-Bi Starch-based film for fresh fruit and vegetables	Starch	http://www.ethicalfruitcompany.co.uk/products/
Plastic Supplies, US	EarthFirst PLA film	PLA	http://pacolabel.com/earth-first.htm
Polar Gruppen, Norway	Mater-Bi starch-based film and bags	starches, cellulose, vegetable oils	http://www.novamont.com/eng/mater-bi
Schmidt Verpackungsfolien, Germany	Cellulose bags for fresh fruit and vegetables and dried foods	Cellulose	http://www.schmidt-verpackungsfolien.de/index.php?id=40&L=1
Sidaplax, Belgium	EarthFirst PLA film	PLA	https://www.plasticsuppliers.com/about-us/sidaplax
Taiyo Kogyo, Japan	PLA film for fruit and vegetables	PLA	

Table 1: *Defines the leading companies working in the area of biodegradable food packaging. Source: Adapted from Developments in Biodegradable Polymers for Flexible Packaging*

Future Direction

Sustainable Packaging will continue to evolve in future and requirement of biodegradable materials will continue to rise for different application. Research should focus in the direction to deliver competitive advantage in comparison to the non-biodegradable packaging materials. Materials based on starch offers alternative solutions due to their eco-friendly character. However, one of the limitation of these material is that they can partially replace existing plastics.

In order to reduce the current environmental issues caused by conventional plastics, it has become necessary to use biodegradable materials from renewable sources for food packaging. Companies should need to improve the sustainability of industrial processes. However, in terms of properties and cost, the competitiveness of bioplastics needs to be improved [2].

Bibliography

1. Sustainable Packaging Coalition (SPC) in the USA.

2. Sustainable Food Systems from Agriculture to Industry Improving Production and Processing. Edited by: Charis Michel Galanakis.

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