Balancing your Packaging Strategy: When are Bioplastics the Right Materials for your Package?

SPC IMPACT 2020 VIRTUAL

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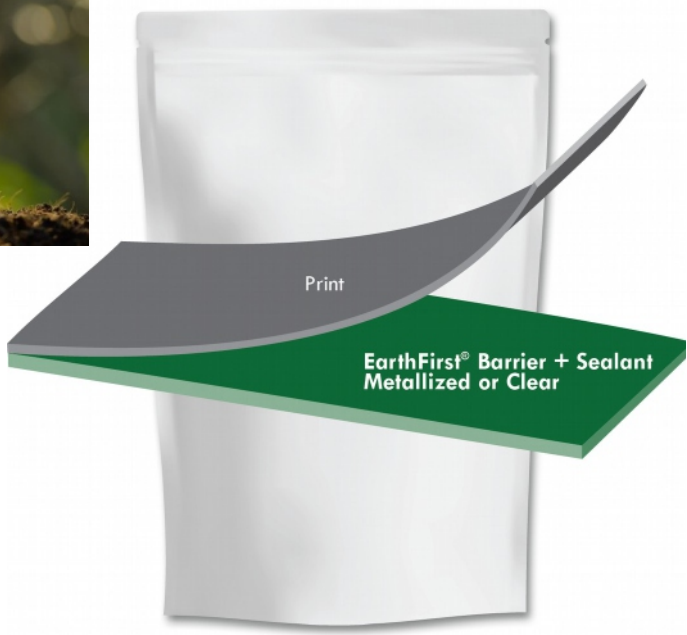
EarthFirst® PLA Bioplastic Sealant Films

- High-purity PLA packaging film > 90% new carbon
- Made from plant-based, annually-renewable sources
- Pound for pound, Green House Gas-favorable to fossil fuel alternatives
- Allow significant source reduction opportunities through:
  - Downgauging in 1-for-1 substitutions
  - Elimination of a film layer in barrier/sealant applications
- Composts into safe natural, organic substances

When would you use EarthFirst® PLA films?

Choose PLA if any 1 or more BRAND PACKAGING objectives are:



Improved Origin of Life (OOL)

- Annually renewable plant based material

Positive Environmental Impact

- Naturally lower carbon footprint (GHG), unit for unit
- Packaging source reduction – downgauging/combining barrier and sealant into 1

Positive End of Life (EOL)

- *Today* - solid waste reduction in non compostable packages
- *Today* - industrial compostable
- *Future* - home, soil and marine compostable options

6 acres of forest preserved from deforestation

Compostable packaging provides an unparalleled opportunity to capture food waste
60 billion pounds of food is landfilled each year in the U.S. [1]

U.S. Environmental Protection Agency 2018[1]

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EarthFirst® PLA films also fulfill specific packaging objectives

PLA bioplastic films have natural characteristics that add value to the product

- Caulking - seals through contamination
- Good linear tear - enhances easy opening
- Stiffness – creates opportunity for significant down gauging
  - Up to 50% package weight reduction
- Lower sealing temperatures - allows for higher line speeds
- Natural affinity for AL/ALOX coatings

EarthFirst® PLA films are ideal for specific packaging *(not an exclusive list)*

Tea | Coffee

Performance
- Layer elimination 3 to 2

Environmental
- Compostability
- Source reduction

Market Drivers
- Plant – based packaging
- Transition to PLA bioplastic tea bags and tea tags

Stickpack

Performance
- Seal through contamination
- Ease of linear tear
- Layer elimination 3 to 2

Environmental
- Source reduction
- Compostability

Market Drivers
- Consumer experience (easy tear) and product retention

SUP | Bar Wrap

Performance
- Layer elimination 3 to 2

Environmental
- Source reduction
- Compostability

Market Drivers
- Connecting natural ingredients to more natural packaging

Product images representative of the product category only

EarthFirst® PLA films are ideal for specific packaging *(not an exclusive list)*

Pouch

Performance

- Seal through contamination
- Low seal initiation temp
- Layer elimination 3 to 2

Environmental

- Source reduction
- Compostability

Market Drivers

- Efficiency on high speed filling lines

Shrink Decoration

Performance

- Highest shrink at the lowest temperature
- Stable in storage up to 100°F

Environmental

- Plant based film
- Compostablility

Market Drivers

- Environmentally friendly packaging - PVC alternative

Product images representative of the product category only

In a short time, bioplastic film technology has advanced significantly

Commercially Available Sealant Films → Industrial Compostable

- Thin gauge non-barrier
- Non GMO
- Metallized barrier
- Clear barrier
- More PE-like, softer, puncture resistant

ISO 17088

- Industrial Compostable to ASTM D6400 and EN 13432

BPI COMPOSTABLE IN INDUSTRIAL FACILITIES Check locally, as these do not exist in many communities. Not suitable for backyard composting. CERT # 890975

INDUSTRIAL COMPOSTABLE DIN Geprüft

OK compost TÜV AUSTRIA INDUSTRIAL

Future technologies create additional End of Life (EOL) options

Industrial Compostable

Home Compostable

Soil Compostable

Marine Compostable

Current

- Metallized barrier film
- Clear barrier film
- Thin gauge non-barrier sealant
- Softer, more elastic, puncture resistant films
- Non GMO films

Next Evolution

Technology

Enzymatic additive activated in lower temperature, home composting

Timing 2021

Certification (Europe)

NFT 51-800

Further Evolution

Technology

Specialty resins combined into commercial PLA bioplastic film

Timing 2021 - 2022

Certification (Europe)

EN 17033

Further Evolution

Technology

Specialty resins combined into commercial PLA bioplastic film

Timing 2021 - 2022

Certification (Europe)

ASTM D6691-17

It is an unprecedented time of consumer pull through

Brands, retailers, converters, industry collaborators and raw material manufacturers play a critical role in determining what packaging materials come to market

When bioplastics are incorporated correctly into industrial compostable packages, they can re-enter the economy as valuable biological nutrients

Commercializing environmentally-responsible packaging requires both collaboration and action

Bioplastic packaging is commercially available, and can make a positive impact today

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