

Aims:

1. Expose biodegradable and / or compostable alternatives to traditional thermoplastics.
2. Know more about the characteristics of PLA (polylactic acid), including its barrier properties.
3. Show possible solutions to improve the characteristics of PLA as packaging material.
4. See to what extent its production and use would be sustainable.
5. As a final objective, with obtained results, determine if PLA is a good plastic alternative to current thermoplastics.

Properties of packaging materials:

- Mechanical.
- Barrier.
- Optical.
- Thermal.
- Packaging-product interaction.

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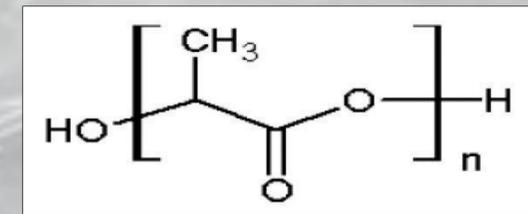


Figure 1: PLA. (Dinesh K. Singh)

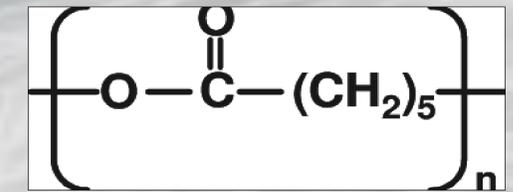


Figure 2: PCL. (Kadriye Tuzlakoğlu)

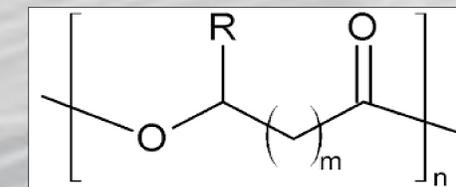


Figure 3: PHA. (R.López)

PLA AS AN ALTERNATIVE

TO

TRADITIONAL THERMOPLASTICS

Table 1: Comparison of PLA's characteristics with other conventional materials (PET, HDPE, PS, LDPE)

Elasticity	> PS , < LDPE
Acidity resistance	. = PET
Aromatic barrier	. = PET
Heat sealing	. = PET, HDPE

Applicable solutions to PLA to improve its characteristics as packaging material:

- Lamination
- Biopolymer blend
- Incorporation of fillers and reinforcements



Figure 5 Examples of containers and utensils made with PLA.

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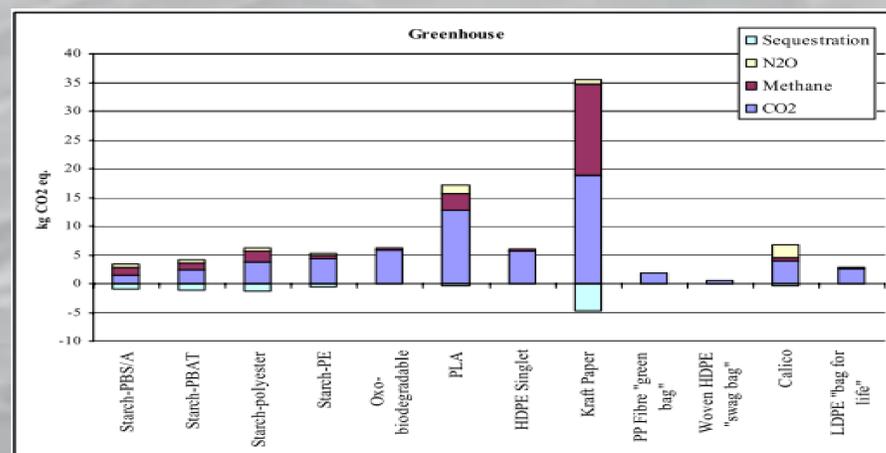


Figure 4: Comparison of greenhouse gas emissions in the production of bags of different plastic materials. (James.K and Grant.T)

Sustainability of the PLA production process and its degradation:

- Renewable sources and land use.
- Biodegradability.
- GMO.
- Life cycle analysis (LCA).
- Greenhouse gas emissions (methane, CO₂, nitrous oxide).

In conclusion:

1. Biodegradable alternatives: PLA, PHA, PCL.
2. PLA's melting and glass transition temperatures are lower than other materials such as PET and has similar or better properties, compared to PS or PET, in terms of flexibility, resistance to fatty foods and barrier.
3. Solutions: Plasticizers, mixture of biopolymers, incorporation of fillers and reinforcements.
4. Unsustainable production system: Large amounts of arable land, water use and phytosanitary; generation of high amounts of CO₂ and methane.
5. Currently, there is no real alternative to using plastic. More research is needed.