



Weft Textiles

Case Study

# How can bio-based and biodegradable polymeric materials be a sustainable long term solution for large scale commercial use?

Bio based and biodegradable polymerics are of great significance for the fragility of our environment with the emergence of BPs being inevitable for its sustainable development. Biodegradable plastics are continually being developed and have the potential for changing how we use and dispose of plastics.

BPs have the potential to be sustainable long-term solutions for large-scale commercial use. However, there are challenges to scaling up production and infrastructure to manage the disposal of these materials, as not all biodegradable materials break down in all environments. It is important to consider the life cycle impacts of these materials and ensure they are properly managed throughout their entire lifespan.



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# How can bio-based and biodegradable polymeric materials be a sustainable long term solution for large scale commercial use?

To be a sustainable long-term solution for commercial use, bio-based and biodegradable polymeric materials must meet certain criteria.

First, they must be cost-effective and competitively priced with traditional plastics.

Second, they must have similar or better performance characteristics to traditional plastics, including strength, durability, and flexibility.

Third, they must be able to biodegrade within a reasonable amount of time and not leave harmful byproducts in the environment.

Finally, the production process must be energy-efficient and use environmentally friendly methods.

If we aim to replace all commodity plastics with biodegradable alternatives to achieve a more sustainable future, we do need to change the way we use and dispose of plastics in general.



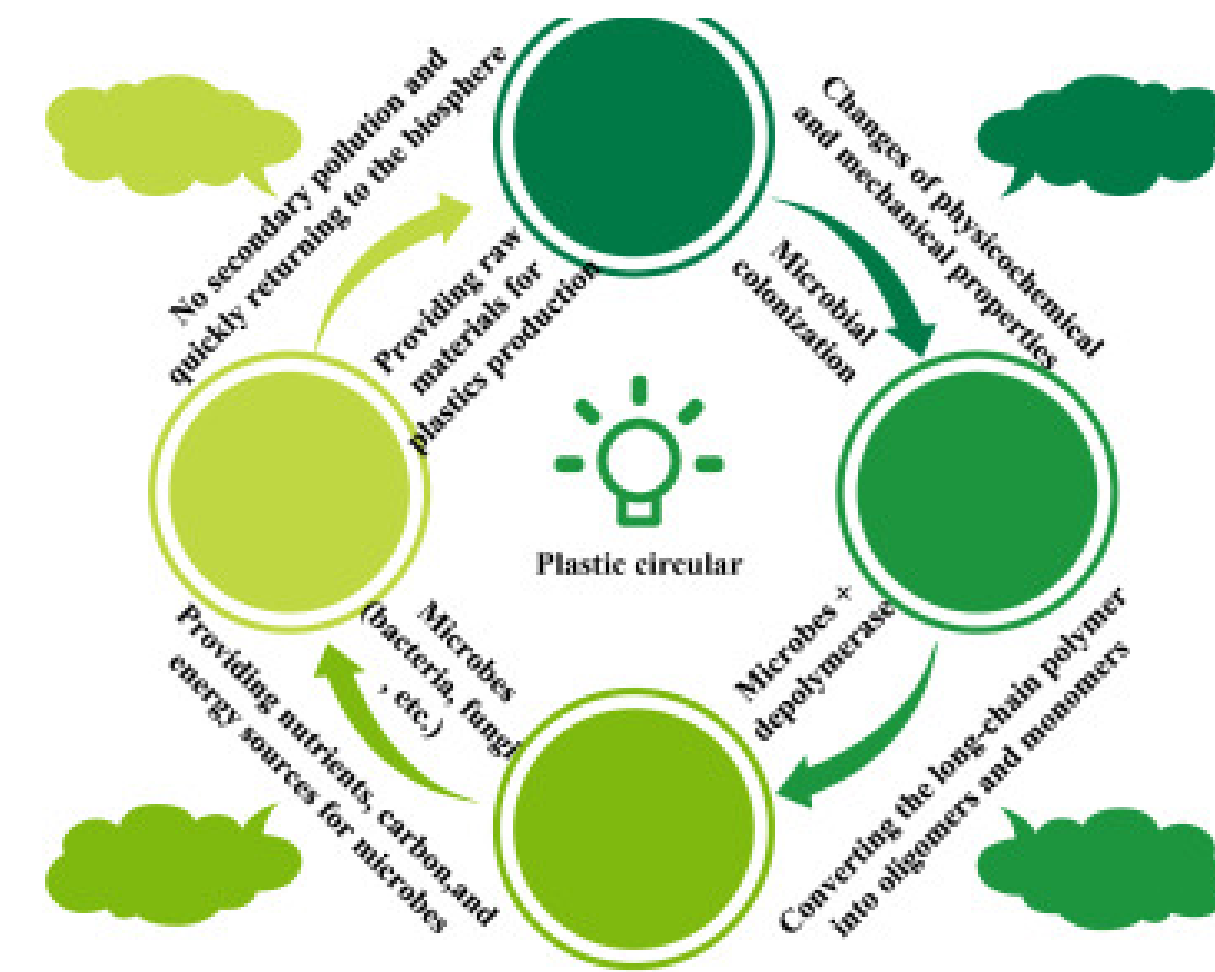
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# What is the problem?

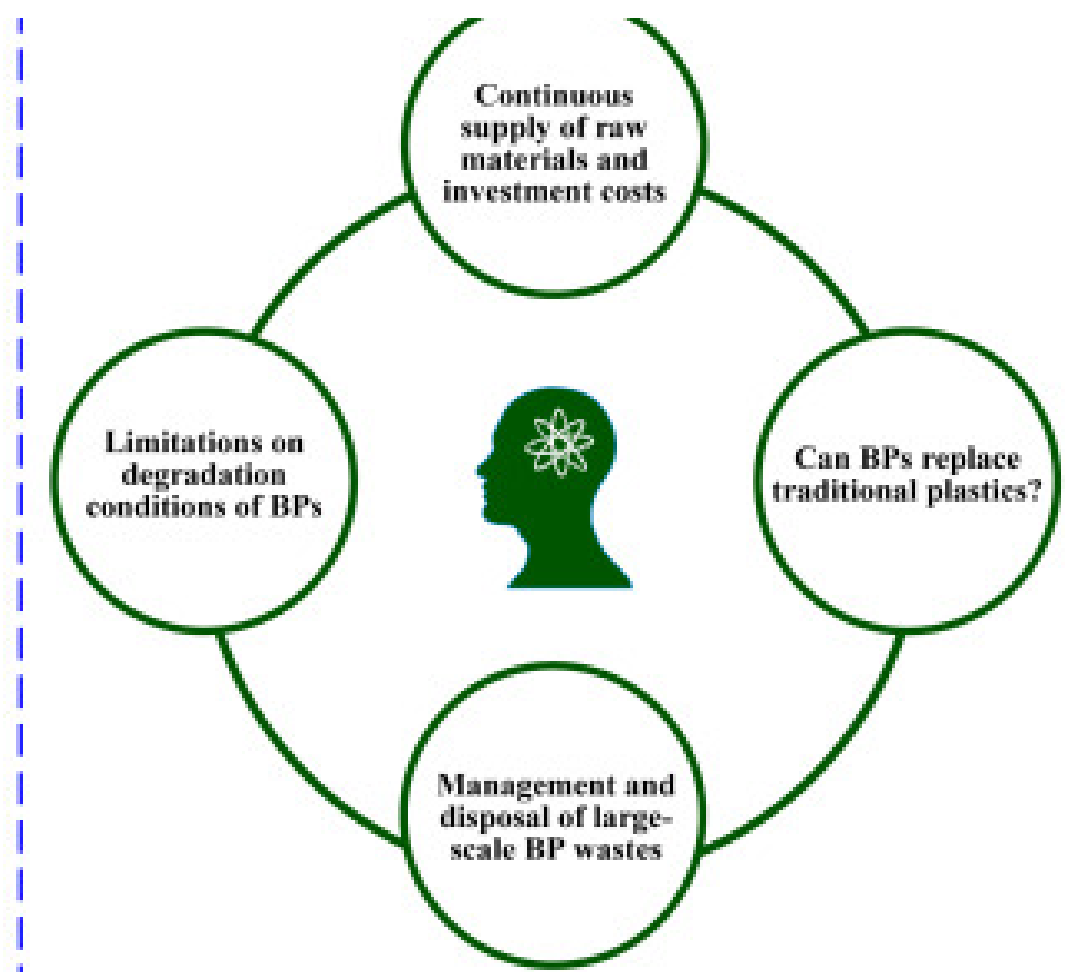
While BP materials do offer several advantages over traditional petroleum-based plastics., they come with problems that are in need of solutions.

The main factor being production cost. Plastic is too cheap, the production process has advanced and is established, and the global use is too large.

The technological development of biodegradable plastics requires chemistry and chemical engineering knowledge, as well as proper assessment of environmental and socio-economic impacts. However, even if it succeeds, this does not guarantee a commercial success.



Biodegradation process of biodegradable plastics



Potential influencing factors of large-scale application of BPs

Source:<https://www.sciencedirect.com/science/article/pii/S0269749119364735>

# Causes & Impact

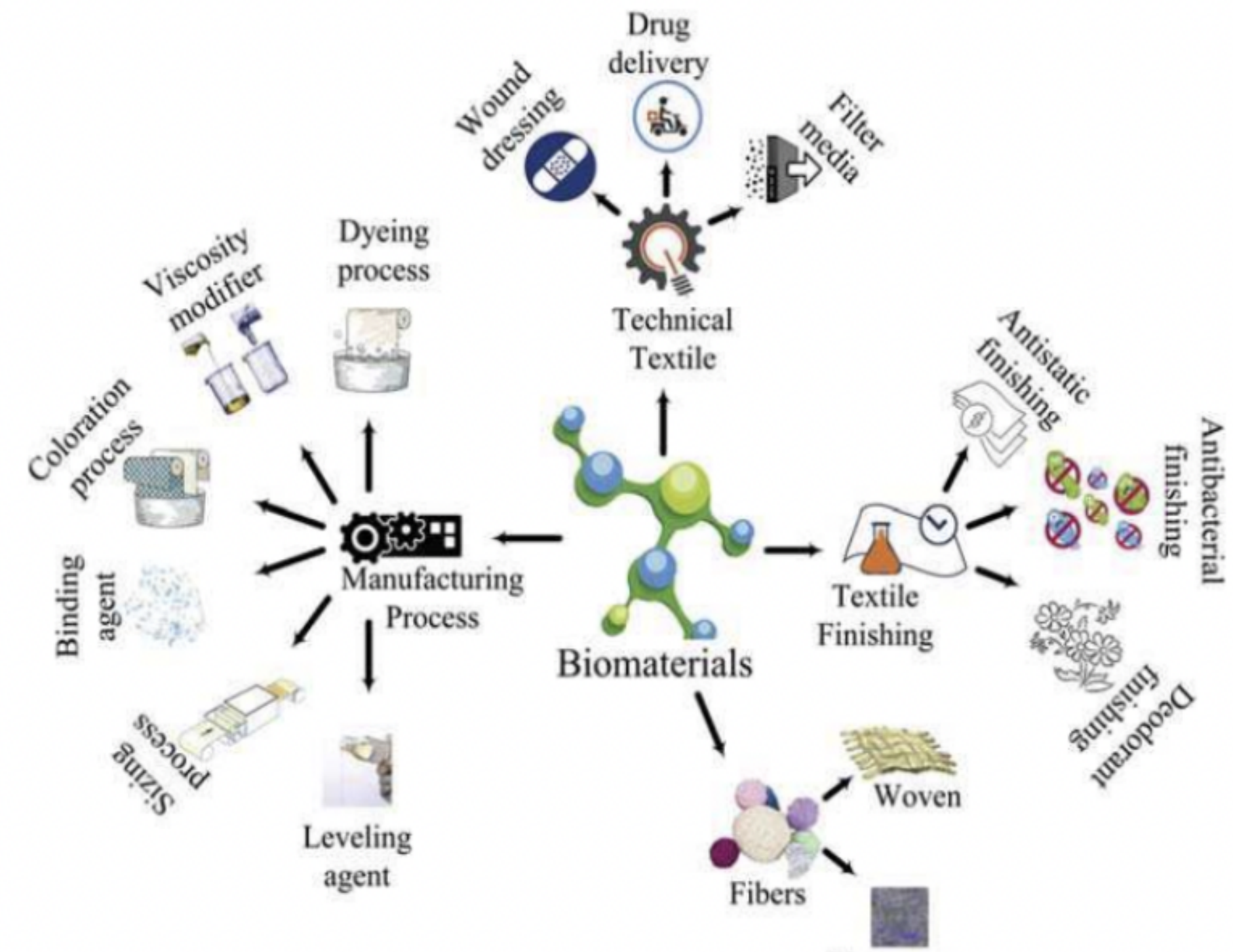
Another cause of BPs is they have the potential to fragment into microplastics and nanoplastics entering oceans and soils, which currently remains an unresolved issue.

PLA polymers poly(lactic acid) is non-degradable in seawater with degradation of other biodegradable polymers also crucially dependant on the environments they end up in, such as soil or marine water.

Difficulties lay in rapid scale and the availability of BP raw materials, and slow adoption of new BPs in the plastic industry.

It is difficult to recycle the waste plastics, and whether the degradation products will not pollute the environment remains to be studied.

There are several important factors to consider with bioplastics being a sustainable long term solution for commercial use, however the main areas we must consider are technical aspects, financial challenges, management and consumers.



Source: <https://www.sciencedirect.com/science/article/pii/S0269749119364735>

# Brands, Organisations, Communities

Several companies and research institutions are actively working to improve the sustainability of bio-based and biodegradable polymeric materials. They are conducting extensive research and development to identify new materials, improve production processes, and enhance performance characteristics, this progression is creating a viable and sustainable choice for large-scale commercial use.

**MycoWorks** is a biotechnology company founded in Germany with the mission to create a platform for the highest quality materials using Mycelium.

**Fab Lab Barcelona** is the first Fab Lab funded in the European Union in 2007 producing research and innovation based around the digital fabrication laboratory and bio and bio based polymers.

**Natural Material Studio** is an international design, research & consultancy studio that drive towards changing our understanding, and perception of materials NMS are committed to being apart of the development of bioplastic used for commercial use.



Source: <https://www.myceliummaterials.nl/>

# Academic References

Biodegradable Polymers: Present Opportunities and Challenges in Providing a Microplastic-Free Environment [Seema Agarwal](#), 2020. The journal presents an in depth mixture of Research Articles, Reviews, Perspectives and Comments with an Impact Factor of 2.996 (Journal Citation Reports (Clarivate Analytics, 2022)).

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