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Mini Review

Food and bio based research are developing complex systems approaches

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Abstract

The circumstances for a revival of our collective vision of food science and technology have now been created by current societal challenges and recent knowledge accumulation. Current reductionist techniques in food science must clearly give way to a knowledge-intensive framework for function-driven research and innovation in order to handle increasingly complex challenges. This necessitates a more thorough, multistate characterisation of bio resources, as well as the development of new transformation methods. These must supply the foundational information needed to create precise transformations that consume the least amount of energy and water and produce the desired end-user products. Food manufacturing should thus be viewed as a complex systems challenge with heterogeneous product matrices, variable processing conditions, non-linear behaviour, unique functional features, and so on.

Keywords: Bio-based, Challenges, Bio economy

INTRODUCTION

It's important to remember that all of the Earth's resources are finite, and that, while recycling is a good idea, it's never perfect. It's also important to remember that the capacity of photosynthetic organisms to capture sunlight limits the production of bioresources. Beyond these fundamental considerations. It is clear that each step in the bio resource to product chain has negative consequences, such as greenhouse gas emissions or toxic compound production. When taken together, these sobering facts begin to reveal the world's current significant societal challenge (Pancaldi et al., 2020).

It is vital to recall that all of the Earth's resources are intrinsically finite and that although recycling is a wise strategy. It is inevitably imperfect regarding bioresources. It is also important to recognize that their production is limited by the sunlight-capturing capacity of photosynthetic organisms.

Beyond these fundamental considerations to achieve both goals, biomass must be produced in a way that does not disrupt future production cycles in accordance with sustainability principles, and the current economy must give way to a bio economy. This is an economy in which the basic components of materials, chemicals and energy are derived from biological resources that are renewable. To establish a bio economy bio resource classification must be reconsidered and new concepts must be developed to reinvent technical itineraries that deliver multiple products for multiple purposes from a single resource or feed multiple resources into specific multi-product value chains (Pant et al., 2019).

A systems approach to bio resource utilisation differs significantly from current reductionist paradigms. Product manufacturing is driven by functionality rather than breaking down and reassembling bio based building blocks to create new complexes. The definition of a primary value chain that delivers a primary product from bioresources is no longer the starting point for product manufacture in a systems approach. Instead, a multistate understanding of the nature and diversity of available bioresources becomes

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the driving force behind the development of smart, flexible transformation technologies that deliver multiple products with target functionalities tailored to different applications. Future processes and products are expected to better meet humankind's local and global demands in this way. As a result food science and technology advance. As a result, food science and technology enters a new era of food and bio resource science and technology, with a renewed mission to understand the diversity of natural resources (Sun et al., 2021).

To accomplish this, future research should focus on the integrated assessment of impacts at local and global scales rather than the definition of disconnected highly localised optimal solutions. Furthermore research should concentrate on the creation of highly efficient bio resource value chains that provide not only food but also the majority of the necessities of daily life. This means that wasting bioresources will no longer be an option. As a result, only a completely new approach that provides a deeper understanding of the nature of bio resources integrated knowledge and efficient transformation pathways is appropriate (Nygaard et al., 2021).

The Bio based Performance Materials (BPM) research programme aims to develop high-quality biomass-based materials such as bio plastics for which there is a growing market demand. Innovative shear-cell technology meat analogues with the appearance taste and texture of steak are now possible. To bring new meat analogues to market a public-private partnership has been formed (Hai et al., 2021).

CONCLUSION

The BPM program's success is due in part to a focus on using all available technologies to create new materials and applications. Many bio based-related research projects five to ten years ago were still focused on the first part of the value chain and only using one type of technology such as biotechnology to create a bio based building block explains. This prevented the product's development from progressing further down the value chain. The focus has been extended to the end of the value chain from the building blocks to the final product.

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