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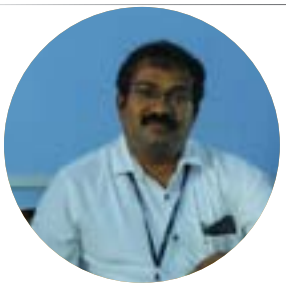

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Transforming biomass to biofuels

Rising energy prices and depleting reserves of fossil fuels continue to renew interest in the conversion of biomass to biofuels production. Biofuels derived from renewable feedstocks are environmentally friendly fuels and have the potential to meet more than a quarter of world demand for transportation fuels by 2050. Moreover, biofuels are expected to reduce reliance on imported petroleum, reduce greenhouse gas emissions, and stimulate regional economies by creating jobs and increasing demand and prices for bioproducts. Biofuels such as ethanol are derived from food crops, biomass, or lignocellulosic materials through biochemical and thermochemical conversion processes. First-generation biofuels (i.e. corn ethanol and biodiesel) are made largely from food crops such as cereals, sugar crops, and oil seeds. The technologies to produce the first-generation biofuels from edible sugars and starches are mature and well understood, and production is primarily limited by environmental and social concerns such as competition for land and water used for food and fiber production causing increase in world commodity prices for food and animal feeds (Sims et al. 2010). Owing to these important limitations the “next-generation”, or second- and third-generation biofuels are being developed from non-edible lignocellulosic materials using advanced technologies. These lignocellulosic feedstocks include woody biomass and wood wastes, crop residues, dedicated energy crops such as switchgrass, municipal wastes, and algae. These next-generation feedstocks do not compete directly with food production and can often be produced on marginal or unused croplands. Furthermore, lignocellulosic biomass is an abundant renewable energy source, with the potential to displace a large portion of conventional energy resources such as fossil fuels and natural gas for the future production of liquid biofuels with improved environmental benefits. As a result, lignocellulosic biomass holds promise as a feedstock for a biorefinery where sugars can be transformed into building-block chemicals through fermentation, enzymatic, and chemical transformations (Ragauskas et al. 2006).Lignocellulosic biomass is a composite structure of lignin, cellulose, and hemicellulose polymers. The efficient utilization of biomass for biofuels production requires a fractionation of biomass constituents into separate streams at maximum yields. However, a major barrier to lignocellulosic biomass utilization in any sugar platform biorefinery is its intrinsic resistance to deconstruction. This recalcitrance results from multiple factors including the heterogeneous nature of the polymer matrix, the complexity of lignin and hemicellulose spatial and chemical interactions, and the extensive hydrogen bonding of crystalline cellulose. Therefore, investigating plant cell wall biosynthesis to unravel the recalcitrant structure of lignocellulosic biomass, exploring the types of pretreatment processes used to deconstruct biomass, and developing efficient enzymatic hydrolysis are main focus areas in converting the polymeric carbohydrates present in plant biomass to fermentable sugars for cost-effective ethanol production.

Biography

Anil Batta is presently professor & Head with senior consultant in Govt. Medical College, Amritsar. He did his M.B.B.S. and M.D. in Medical Biochemistry from Govt. Medical College, Patiala in 1984 and 1991, respectively. His research interest is mainly in clinical application especially cancer and drug de-addiction. He has supervised more than 25 M.D., M.Sc. and Doctorate researches and published more than 130 international research papers. He is the chief editor of America’s Journal of Biochemistry. He is also working as advisor to the editorial board of International Journal of Biological and Medical Research. He has been deputed member Editorial Board of numerous International & National Medical Journals of Biochemistry. He has also been attached as technical advisor to various national and international conferences in Biochemistry. He has been attached as hi-tech endocrinal, genetics and automated labs of Baba Farid Univ. of Health Sciences, Faridkot. He has chaired various sessions in the Biochemistry meets. He has been designated as member Editorial Board of various in US and other European Courtiers. He is also involved in various research projects at Govt. Medical, Amritsar. He has done superspecialisation in Drug-de-addiction from PGIMER, Chandigarh.

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