Lignin a versatile biopolymer from date palm biomass

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Date palm productivity in Arab countries (Saudi Arab, Egypt, Iraq, Morocco, and the UAE) accounts for approximately 70% of the date palm worldwide. The waste generation from the various parts of the date palm trees in the Arab region is the prime point of concern. Date palm biomass, including fronds, leaves, trunks, fruit bunches, seeds, and fibers, is generated in large quantities in date-producing regions and is often underutilized or treated as agricultural waste. By attention to the date palm biomass production in UAE, the research community shown keen interest to explore date palm biomass as potential alternative materials for various applications. This will also help to curtail the CO_2 emission reduction which discussed during COP 28 at UAE. Lignin is identified as a significant biopolymer to be synthesized from the biomass due to its enormous application possibilities. It is necessary to study the potential of using lignin extracted via NADES from date palm biomass which help in development of alternative solution. Due to its complex aromatic structure, lignin can be used in the production of bio-based chemicals, adhesives, composites, carbon materials, antioxidants, and energy-related products. The valorization of lignin from date palm residues can reduce environmental pollution, support waste management, and contribute to the development of a circular bioeconomy. This abstract highlights the importance of date palm biomass as a promising source of lignin and emphasizes its versatility as a biopolymer for industrial, environmental, and sustainable material applications. Further research on efficient extraction, modification, and application of lignin from date palm biomass can enhance its commercial value and promote the use of renewable resources.