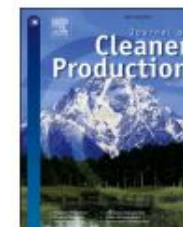




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### Review

## Agricultural waste-derived (nano)materials for water and wastewater treatment: Current challenges and future perspectives

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### ABSTRACT

The general environmental quality has a direct impact on how well life is supported on earth. There are fewer and fewer water sources available, and those that are available are contaminated with many pollutants. Pollution of biological and chemical systems can result from heavy metal and dye poisoning of water resources. Agricultural waste benefits from a variety of sources, cheap cost, and renewable energy. When these wastes are converted into useful applications, such as environmental adsorbents for eliminating pollutants, biochar (BC), composts, and natural fertilizers, rather than burning them in open fields, which results in various environmental problems like air pollution and soil erosion, they may represent a treasure. The transformation of waste into useful compounds is one of the most significant scientific topics. This critical study evaluates current advancements in the utilization of (nano)materials obtained from agricultural waste for environmental decontamination and pollutant monitoring or removal. Along with highlighting the most promising research areas, this section discusses the major challenges to the removal of organic dyes, toxic ions, and other contaminants using diverse methods including adsorption, reduction, and ion exchange using cost-effective materials generated from agricultural wastes.