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Textile Emanating Harmfulness Pattern: A Scientometric Examination

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Description

Material creation produces high volumes of shaded effluents, including a few poisonous substances possibly perilous to the climate. It is essential to emphasize that decolorization does not remove toxicity, and there is currently no scientometric perspective on this topic. The purpose of this study was to scientifically review the current state of knowledge regarding the toxicity of textile effluents, highlighting scientific trends and omissions, research hotspots, and science statistics, and determining the paths that should be taken in the future. Between the years 1945 and 2020, the words "textile effluent" and "toxicity" were searched in the Web of Science. CiteSpace, Excel, Statistica, and Bibliometrix software were used to analyze 214 articles that had a relevant impact factor (H-index = 45) and were retrieved and chosen for analysis. It is evident that more research and attention are needed right away to discover effective strategies for managing textile wastewater. India, Brazil, and Turkey have the most publications on the subject and are also the world's top textile producers. The search for nontoxic, effective, and economically viable effluent treatments that would promote decolorization was the primary focus of the efforts. Highlights that forty years have passed since the first edition was published, and there is still no effective and sustainable method for managing this waste [1].

The production of clothing and fashion is an essential industry for modern humans because it serves the fundamental social function of providing millions of people with clothing and jobs; in addition to moving billions of dollars around the world, which aids in the economic growth of several nations. From the beginning of the processing process to the end of the production chain, the textile industry produces waste. Due to its toxicity, textile effluent is one of the main pollutants. These effluents are a complex and toxic liquid with high chemical oxygen demand (COD), biochemical oxygen demand (BOD), total suspended solids (TSS), total dissolved solids (TDS), total nitrogen (TN), alkaline pH, salinity, and temperature. They also contain dyes, metals, softeners, detergents, and other chemicals [2].

Metals are present in textile effluents in varying amounts due to dyes and additives like caustic soda, sodium carbonate, and salts, which are used in industrial processes. The chromophore group, which also includes azo (N = N), carbonyl (C = O), quinoid, and auxochrome groups like amine, carboxyl, sulfonate, and hydroxyl, is the chemical structure that gives dyes their color. Cobalt, copper, and chromium have all been found in other chromophores studies. Chromium, zinc, iron, mercury, and lead are the main metals in the effluent that pose a threat to the environment. Due primarily to the restriction of light entering the water body, the color of textile effluents affects the photosynthetic function of aquatic organisms and, consequently, their aerobic activities. The health of various organisms and the environment are both seriously harmed by each of these factors [3].

In order to make the textile industry completely sustainable, the majority of scientific studies seek treatments that are both effective and inexpensive, capable of degrading dye, reducing the toxicity of effluents, and offering advantageous cost-benefit ratios to the textile industries. Ion exchange, industrial enzymes, and electrocoagulation using a metallic iron anode as a catalyst are effective and cost-effective, but they also have some drawbacks. To effectively treat textile effluent, there is still no one-of-a-kind, zero-waste method that is both economically viable and effective. It should be noted that decolorization does not guarantee that toxicity will be removed, and the reduction or degradation of some molecules or compounds can produce toxic intermediate compounds. Then, in order for a method to be effective for decolorization, it must include toxicological analyses of various aquatic organisms in addition to physicochemical analyses to guarantee environmental safety and treatment efficacy in terms of toxicity. To hinder, the actual textile effluent's composition varies depending on the type of fabric produced and processed, the raw material used to make the fabric, the dyes used, fashion trends, factory equipment, and chemicals used. It is difficult and laborious to keep track of the advancement of knowledge worldwide and to identify gaps, limitations, and trends due to the large volume of scientific data published each day. It slows down scientific discovery advancements because it reduces information connectivity between researchers in different nations. The set of scientific productions that are available can be adequately quantified and analyzed with the help of scientometric methodologies. Because they make it possible to measure the current state of the art in the field and also because they contribute scientific knowledge through publications in particular research fields that are based on quantitative evaluation techniques. It is possible to map journals, countries, authors, the most active areas of research, and the main fields of research. It is also possible to identify and visualize the main factors that influence the development of knowledge on a particular subject [4,5].

Acknowledgement

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Conflict of Interest

None.

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