Treating Harmful Effluents

Why in news?

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Researchers at Shivaji University have found a bio-remediation method to clean up the toxins generated from the dye-industries.

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How harmful are the textile dyes?

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- Textile dyes are one of the most polluting chemicals that routinely go into our water-bodies.
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- Effluents discharged from the dye industry contain a variety of toxic molecules that, if allowed to flow untreated, severely erode river water quality.
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- These chemicals can trigger allergic reactions, undesirable genetic mutations and even cancer in humans, plants or river organisms like fish.
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Chemicals in Dye Industry:

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- A large number of synthetic chemicals and colouring agents are used in the dye industry.
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- Many of them contain large organic molecules, commonly known as azo-compounds with nitrogen-nitrogen triple bonds.
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- These chemicals are stable for a long time. They can be rendered harmless if broken into simpler compounds that can be easily absorbed by nature.

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- This breakdown requires human interventions.
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How can they be treated?

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- Effluent treatment plants are a common way of dealing with this, but it has been seen that even after treatment, the effluents contain some residual chemicals.
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- Researchers at Shivaji University have been working on bioremediation of textile waste water for close to 10 years now.
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- Their effort has been to use a completely natural process to clean the effluents from the textile industry, without any chemical intervention.
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What is the role of micro organisms?

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- Some microorganisms (Pseudomonas, Bacillus) are known to have the ability to break down the complex synthetic dye molecules into simpler compounds.
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- During the research, it was found that the presence of certain varieties of plants (aquatic plants: Ipomea aquatica, Ipomea hederifolia, Salvinia molesta, Typha angustifolia, Paspalum scrobiculatum, Blumea malcolmmi, Fimbristylis dichotoma ; flowering plants: Petunia grandiflora, Portulaca grandiflora, Aster amellus, Tagetes patula, Gaillardia grandiflora) in the area in which industrial waste water is released, prior to being allowed to flow into the water body, helps in the reduction of harmful chemicals.
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- It was believed at the time that these plants were producing certain nutrients that helped the microorganisms flourish in that environment.
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- These microorganisms, in turn, could work effectively to degrade the toxic chemicals.
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What is the role of certain plant varieties?

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- Continued study has now led to conclude that these plants themselves are helping reduce the harmful compounds.
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- These plants secrete certain enzymes (laccase, azo reductase and lignin peroxidase) that have the ability to degrade the pollutants.
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- The combined activity of the plant as well as the microorganisms, therefore, offers a much more efficient way to deal with the toxicity of textile chemicals.
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\n**Source: The Indian Express**

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