

GREEN INNOVATION: IIT team uses food waste to make stronger concrete

Our Staff Reporter

INDORE

Globally, about one-third of food ends up as waste. The decomposition of this waste results in emission of about 4400 million tonnes of CO₂, equivalent to 8 per cent of global carbon emissions.

But what if the food scraps are used to make concrete more robust and sustainable, reducing CO₂ emissions?

The process can reduce up to 20% of CO₂ emissions from the construction industry, one of the highest contributors of greenhouse gases in the country

In a green innovation, a team of researchers from IIT Indore has demonstrated that addition

of food waste along with selected non-pathogenic bacteria can double the strength of concrete, improve durability, repair cracks and help with CO₂ capture, along with cutting down the cost of concrete. The research team, which consisted of Prof Sandeep Chaudhary, Dr Hem Chandra Jha, Dr Akshay Anil Thakare, Shivam Rajput and Dr Sanchit Gupta combined its expertise of civil and bio engineering to develop this

process.

The research team estimates that the final form of their process can reduce up to 20% of CO₂ emissions from the construction industry, one of the highest contributors of greenhouse gases in the country.

Chaudhary said, "When food waste decomposes it generates CO₂."

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"If we add bacteria and food waste in the concrete, the CO₂ is released inside. This CO₂ reacts with calcium ions present in concrete and creates calcium carbonate crystals. These crystals fill the pores and cracks present in concrete and make the concrete dense without any significant effect on weight. Denser concrete has higher strength and durability, hence works better. The process on the one hand traps the CO₂ from food waste and on the other reduces the cement requirement for concrete, providing a double benefit towards carbon reduction."

Jha added, "The process of incorporating food waste and identifying a suitable non-pathogenic bacterium makes it unique. Earlier applications of bacteria in concrete used synthetic chemicals, which made the process costly and less sustainable. After investigating several different methods of incorporating food waste, we used food waste in powder form, making it easier to dissolve in water and not hinder the properties of concrete. In over 20 years of research with different bacteria, this is also the first time when bacteria have doubled (205.94%) the strength of concrete and shown lower effective cost and carbon footprint. The researchers from IIT Indore have used E. Coli DH5, which is a type of bacteria with no pathogenic activity. The novel combination of E. Coli DH5 and food waste makes it a promising solution towards sustainable construction."

According to the research team, its existing work is currently suitable for factory scale application. This means that manufacturers of bricks, blocks and precast concrete can use this research for producing low cost and low carbon building materials. The team is working towards streamlining the process of incorporating food waste and bacteria, so as to make it easier for use in all types of construction applications.