

Bangalore Mirror

TEMPERATURE MAX 28 | MIN 20 | HUMIDITY 90%

FORECAST GENERALLY CLOUDY SKY | SUNRISE 06:09 HRS | SUNSET 18:06 HRS | SENSEX 19,527.15 ↑ | NIFTY 5,780.05 ↑ | GOLD ₹ 30,288.00/100



Clockwise from top: Dr Pankaj Aggarwal (in white shirt) and Dr S S Chauhan working at the extrusion system. Polymer granules extracted from polylactic acid. Pen, hanger and sticks made of wood plastic



City scientists turn plastic eco-friendly

Research has produced plastic from starch or molasses that degrades quickly and 'wood plastic' that is cheaper than conventional plastic

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Plastic, once seen as the modern age's answer to the product needs of industry, is now demonised across the globe for being virtually non-degradable and thus a threat to the environment. Coming to its rescue, as it were, three scientists at the city-based Institute of Wood Science and Technology (IWST) have developed biodegradable plastic from plant starch and molasses. Not just that, they have also developed 'wood plastic', a combination of wood and plastic, which has the potential to reduce the overall consumption of plastic.

The scientists, who have been working on the project for the last eight years, have patented a coupling agent that blends plastic with waste wood or sawdust to provide wood plastic which is 50 per cent biodegradable. They have successfully fabricated some consumer durables and are on the verge of transferring the technology to industry.

Speaking to BANGALORE MIRROR, Dr Ajay Karmarkar, a scientist at IWST, said, "There have been several experiments in recent times addressing usage and disposal of plastic, as conven-

tional plastic made out of fossil fuels is not biodegradable. Though a couple of countries in the West have developed plant-based biodegradable plastic, this is for the first time that we in the country have initiated research in this direction. Our scientists have used a small chemical agent to convert corn starch into a biopolymer that degrades in a few weeks. The molasses-based polymer was obtained in a manner similar to the way alcohol is extracted. A different type of bacteria can convert molasses into lactic acid and the same is polymerised by using initiators. While the polymer extracted out of plant and vegetable starch can be used for packaging of food items, the poly-lactic acid polymer can be used like conventional plastic and can be moulded into consumer durables that do no harm to the environment when disposed of."

On the blending of plastic and wood, another IWST scientist, Dr Pankaj Aggarwal, said, "Wood and plastic are like oil and water — not compatible with each other. Fusing both was one of the toughest challenges for us. While wood is hydrophilic (water-absorbent), plastic is hydrophobic (water-repellent). By introducing a coupling agent — a compatibiliser developed at IWST — we have been able to blend both with

improved mechanical properties."

Another scientist, Dr Shakti Singh Chauhan, said, "You can mix plastic with any type of wood, ranging from fallen branches to sawdust. Conventional plastic is mixed with the coupling agent. Both the plastic and the wood in the form of powder are fed into a twin-screw extrusion system from two separate inlets. The mixture blends at a pre-designated temperature inside the extrusion system. The result is 'wood plastic' in the form of fine granules which can be melted and moulded into any shape." The IWST scientists have applied for a patent for the compatibiliser.

"Currently a kilogram of fossil fuel-based polymer costs Rs 110 and there are further manufacturing costs. But if you use wood along with plastic, you can cut costs considerably and also reduce consumption of plastic. Waste wood or sawdust is available for Rs 5 to Rs 6 a kg and with an additional Rs 4-5 a kg for the coupling agent, you can get the plastic-like material at a much lower cost, which can be recycled many times. There is no threat from pests to the wood in the material, owing to the presence of plastic. But it may catch fungus on exposure to moisture, which we have anticipated by adding borax and boric acid," Dr Aggarwal said.