

An Everyday Mushroom That Now Fights Anaemia

Scientists at Pantnagar University have used fundamental nanotechnology framework to pack ordinary oyster mushrooms with iron: a low-cost way to tackle one of the world's most stubborn nutrition problems

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Researchers at G.B. Pant University of Agriculture and Technology, Pantnagar, have now added a new ingredient to the everyday kitchen foods: the humble white oyster mushroom, or “Dhingri mushroom” as it is fondly known across the country. Using an innovative nanotechnology treatment, the team has learned how to grow oyster mushrooms that carry far more iron than nature ever gave them; turning a tasty side dish into a genuine tool against anaemia and hidden hunger.

The invention, recently fetched a patent for the University, does something deceptively simple. During specific cultivation methodology, the mushrooms are treated with tiny particles of iron sulfide, each only a few billionths of a metre across. At that scale, the particles slip easily into the growing mushroom’s tissues, and the edible fruiting bodies soak up the iron as they mature. The result is an edible mushroom whose iron content rise significantly higher by as much as 48 percent, without changing the mushroom into anything strange or unfamiliar. It still looks, cooks and tastes like the oyster mushroom people already enjoy.

Why a mushroom, and why iron?

The oyster mushroom is already one of the great success stories of Indian farming. It is amongst the most cultivated mushrooms in the world, and grows happily on cheap agricultural waste, such as wheat straw, needing no fertile land and most importantly very little water. Weight for weight, it delivers an impressive amount of protein along with dietary fibre and remarkably little fat or starch. Delivering exactly what the health-conscious Gen-Z is craving for. Over the years, researchers have linked regular mushroom eating with a stronger immune system and a lower risk of several chronic illnesses. In short, it is an inexpensive, wholesome food that millions of families can grow or afford.

But the mushroom had one weakness. For all its virtues, it contains very little iron and in today’s world iron is exactly the nutrient that so many people are missing. Iron may be the most quietly

important mineral in our bodies. It carries oxygen in our blood, helps build DNA and powers the tiny chemical engines inside every cell. When it runs short, the consequences are serious: tiredness, weakened immunity, poor concentration and stunted growth in children. The World Health Organization estimates that around two billion people worldwide are anaemic and roughly half of such cases are caused due to a simple lack of iron. In a country like India, it is a public health emergency hiding in plain sight.

A cheaper answer than tonics and pills

There are, of course, iron tablets and tonics available off the shelf in the market. The issue is that they cost money and often reach only those who can already afford them. Genetically modified crops have been proposed as another route to iron-rich food, especially wheat, but they carry safety, ethical and regulatory concerns that have kept them from wide acceptance.

This is where the Pantnagar's approach stands out. Instead of engineering the mushroom's genes or asking families to buy supplements, it enriches the food naturally, during the business of growing it. The iron is built into the mushroom on the farm, so a family that eats iron-fortified Dhangri gets its dose of the mineral straight from a normal, home-cooked meal, without resorting to pills and prescriptions.

The research team comprising of Dr. Sandeep Arora, Dr. KPS Kushwaha and Dr. Bandana Kumari states that "The beauty of this method is that it meets people where they love it the most *i.e.* at the dinner table,". "We are not asking anyone to change their diet or their budget. We are simply making a food they already love, but now a little more nourishing."

Good for the farmer, too

The benefits do not stop at nutrition. In the team's trials, the nanoparticle treatment that boosted iron also improved the mushrooms themselves with larger caps, sturdier stalks and a bigger overall harvest from the same batch of substrate. Equally important, the treated mushrooms reached their peak yield faster. For a small mushroom farmer, that is a double reward: a more valuable, iron-rich crop that can also be brought to market sooner, allowing more crops to be raised in a season and more income earned.

The researcher's claim that this combination is unusual. Most nutritional interventions add cost somewhere along the line. Here, the enrichment travels hand in hand with a stronger, quicker harvest, so the economics work for the farmer and the family alike.

A quiet revolution on the plate

What makes this invention so appealing is its humility. It does not demand new habits, expensive medicines or complex science from the people it helps. It takes a food that is already cheap, sustainable and widely grown; and quietly upgrades it to fight one of the most widespread deficiencies on the Earth.

The road from 'culture room' to 'living room' still has several miles to go. Scaling up, refining the growing methods and getting fortified mushrooms into local markets, throws-up multiple levels of challenges. But the business idea at its heart is powerful. For the millions who quietly carry the weight of iron deficiency, a plate of iron enriched 'Dhingri mushroom' may turn out to be a very big small thing.