

Supplementary Fig. 1 Fungi used for synthesis of copper nanoparticles, (A) *Trichoderma virens* and (B) *Chaetomium globosum*.

## Biosynthesis of copper nanoparticles using fungal supernatant

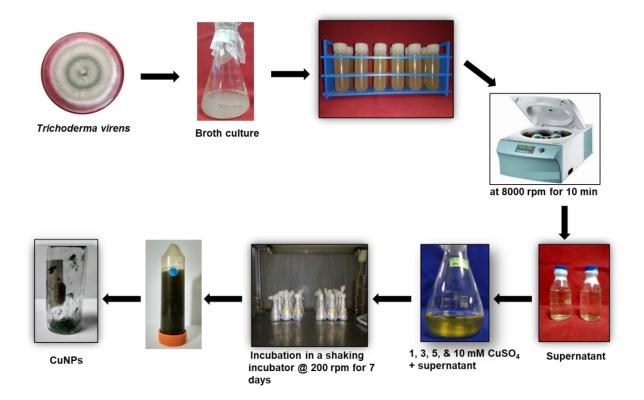
Cultures of *T. virens* and *C. globosum* were grown in Czapek-Dox Broth (CDB), at a temperature of 28°C, with a relative humidity of 80±5%, maintained for 10 days. The supernatant was obtained from the broth by filtration through a sterile muslin cloth, followed by centrifugation at 8000 rpm for 10 min. The resulting supernatant was carefully collected and subjected to an additional filtration step using Whatman paper (Axiva 100 R grade) to eliminate any spores or mycelial fragments. This clarified supernatant was then stored in a screw-capped bottle, sealed with parafilm, and observed for any fungal re-growth over a few days. If re-growth occurred, the supernatant was subjected to centrifugation and filtration once more to ensure a cell-free supernatant.

The study involved four different concentrations of CuSO<sub>4</sub> solution (1 mM, 3 mM, 5 mM, and 10 mM) prepared in distilled water (Type III water). Various pH levels ranging from 5 to 10 were examined, with pH 8.5 identified as the most favourable. The specific ratios of CuSO<sub>4</sub> to supernatant used are detailed in Supplementary Table 1. The reaction was conducted in a dark condition, incubating for 7 days at 28±2 °C with constant shaking at 200 rpm.

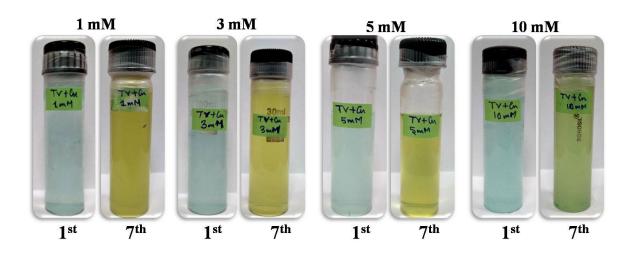
incubated for 7 days at a controlled temperature of 28±2°C, with continuous shaking at 200 rpm. Subsequently, the biologically synthesized nanoparticles (NPs) were harvested through centrifugation at 10,000 rpm for 10 minutes, followed by lyophilization, as depicted in Supplementary Fig. 2.

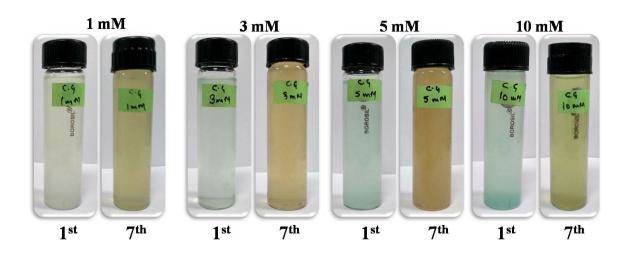
Supplementary Table 1 The ratio of CuSO<sub>4</sub> to fungal supernatant used for the biosynthesis of CuNPs

Particulars	fungal supernatant:CuSO <sub>4</sub>
	(V/V)
1 mM CuSO <sub>4</sub>	1:1
3 mM CuSO <sub>4</sub>	1:1
5 mM CuSO <sub>4</sub>	2:1
10 mM CuSO <sub>4</sub>	3:1.

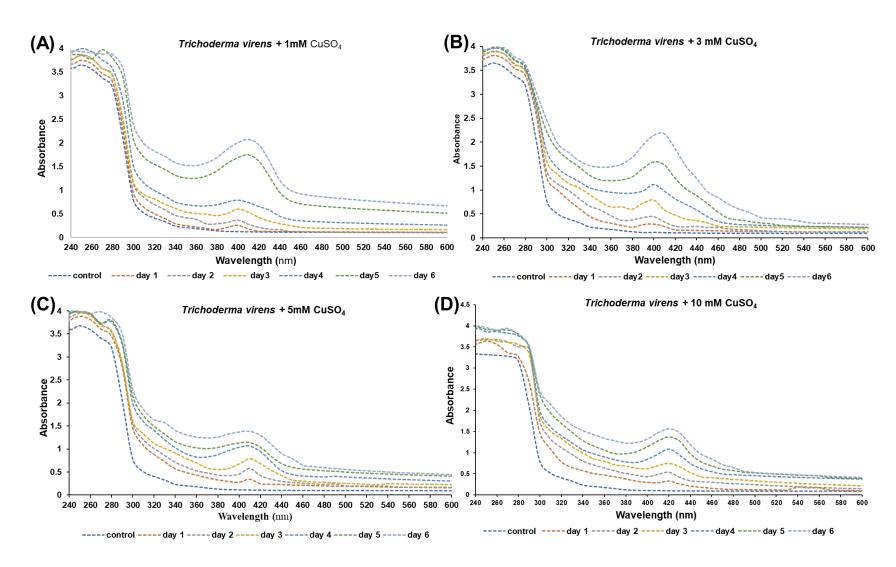


Supplementary Fig. 2 Standardized protocol for the biosynthesis of CuNPs using fungi.

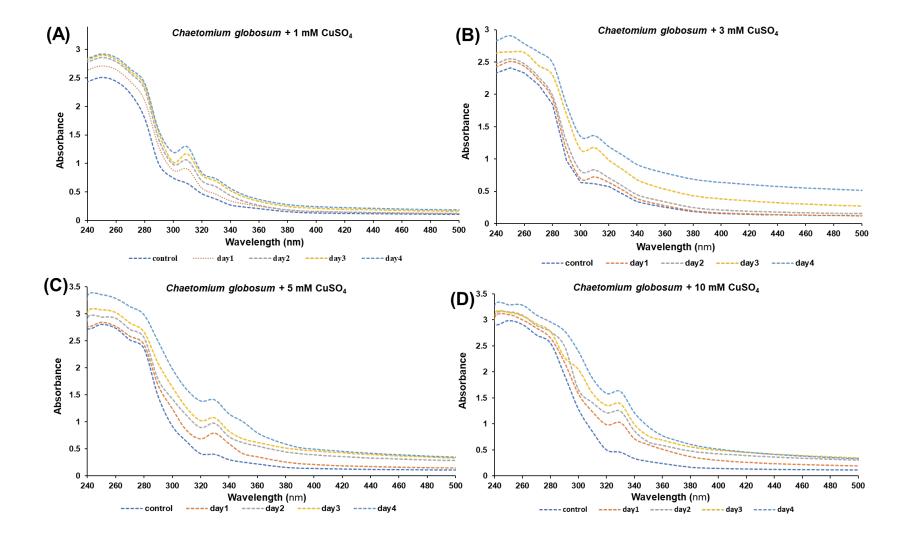




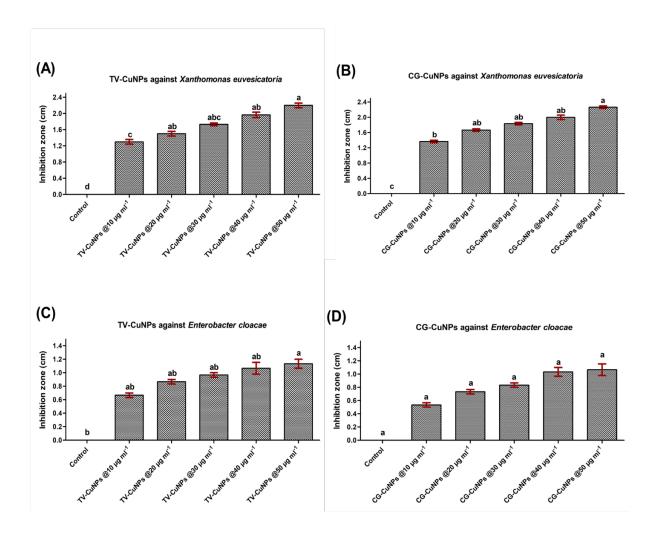
Supplementary Fig. 3 Color change of the reaction mixture after 7 days incubation (A) *Trichoderma virens*+1, 3, 5 and 10 mM of CuSO<sub>4</sub> solution; (B) *Chaetomium globosum* + 1, 3, 5 & 10 mM of CuSO<sub>4</sub> solution.



Supplementary Fig 4. UV-Vis spectrum as a function of time in a solution containing *Trichoderma virens* supernatant and 1 mM (A), 3 mM (B), 5 mM (C), and 10 mM (D) CuSO<sub>4</sub> solution.



Supplementary Fig. 5 UV-Vis spectrum as a function of time in a solution containing *Chaetomium globosum* supernatant and 1 mM (A), 3 mM (B), 5 mM (C), and 10 mM (D) CuSO<sub>4</sub> solution.



Supplementary Fig. 6 The *in vitro* antibacterial efficacy of TV-CuNPs (A) and CG-CuNPs (B) against *Xanthomonas euvesicatoria*; TV-CuNPs (C) and CG-CuNPs (D) against *Enterobacter cloacae*. Data (Mean  $\pm$  Standard errors) with different letters are significant in each graph (Tukey, HSD, P $\leq$ 0.01). TV-CuNPs: *Trichoderma virens* mediated CuNPs; CG-CuNPs: *Chaetomium globosum* mediated CuNPs.