

Compost is a major source of pathogenic aspergillus spores

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Fourteen percent of *Aspergillus fumigatus* isolates cultured from garden soils were resistant to an agricultural triazole antifungal drug, tebuconazole. Tebuconazole resistance confers resistance to medical

triazoles that are used to treat aspergillosis, a lung infection that can be serious, which results from inhalation of *A. fumigatus* spores. The research is published in *Applied and Environmental Microbiology*, a journal of the American Society for Microbiology.

In the study, which was lead author Jennifer Shelton's Ph.D. thesis, she and her collaborators found that compost and compost-enriched soils contain high concentrations of *A. fumigatus* spores.

"The research suggests that handling compost presents a public health risk when individuals are exposed to large numbers of aerosolized spores and raises questions of whether compost bags should carry additional health warnings, whether compost should be sterilized before shipping, and whether individuals should be advised to wear face masks when handling compost," said Shelton.

A novel aspect of this study is that the [soil](#) samples—509 of them—were collected from their gardens by 249 citizen scientists whom Shelton enlisted in this effort via social media and through the Aspergillosis Trust, a charity raising awareness of the problem. The samples were all collected on the same day, June 21, 2019. From these, the investigators cultured 5,174 isolates of *A. fumigatus*. Many of these *A. fumigatus* isolates contained polymorphisms in the *cyp51A* gene, which is frequently associated with triazole-resistance. Soil samples containing compost were significantly more likely to grow tebuconazole-resistant *A. fumigatus* strains than those that did not, and compost samples grew significantly higher numbers of *A. fumigatus* than other [soil samples](#).

The study was motivated by a growing number of cases caused by triazole resistant *A. fumigatus* spores in the UK, said Shelton, who conducted the research at Imperial College London and UK Centre for Ecology and Hydrology. "An estimated 185,000-plus people in the UK live with aspergillosis, with conditions ranging from severe

hypersensitization, "fungal asthma," and chronic colonization or invasion of the lungs that can disseminate to other organs including the brain," said Shelton. "Chronic forms of aspergillosis are life-limiting and difficult to treat, and invasive infections have [mortality rates](#) of between 40 and 70 percent, and higher if infected with triazole resistant *A. fumigatus*."

People normally inhale spores from the environment, including those of *A. fumigatus*. Those with weak immunity, due to immune-suppressing drugs, conditions such as diabetes or [rheumatoid arthritis](#), or lung damage from infection by tuberculosis, COVID-19, severe influenza or smoking, are especially vulnerable, but even those without predisposing conditions can develop aspergillosis if they inhale sufficient numbers of spores.

"Our research suggests that handling compost and [compost](#)-enriched soils exposes individuals to large numbers of [spores](#) and that behavioral changes on their part, and action taken by the composting industry could reduce these exposures," said Shelton.

More information: Jennifer M. G. Shelton et al, Citizen-science surveillance of triazole-resistant *Aspergillus fumigatus* in UK residential garden soils, *Applied and Environmental Microbiology* (2022). [DOI: 10.1128/AEM.02061-21](#)

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