# Experts weigh in on fungal threats amid climate change as The Last Of Us sparks debate



A popular post-apocalyptic television drama has reignited discussion among experts about the potential human threat of fungi, amidst growing concerns linked to climate change. The series, The Last Of Us, currently airing its second season on Sky Atlantic, features a fictional pandemic caused by a cordyceps fungal outbreak that turns people into violent creatures.

Set in a world devastated by this fungal pandemic, the show stars Pedro Pascal and Bella Ramsey and introduces a character portrayed by John Hannah, who is an epidemiologist warning viewers about the impact a warming climate could have in making certain fungi more dangerous. In the first episode, his character states, “Candida, ergot, cordyceps, aspergillus: any one of them could be capable of burrowing into our brains and taking control of not millions of us, but billions.”

While this scenario is markedly dramatized, experts highlight that fungal infections do indeed pose serious health risks, although not on the scale or nature depicted in the series. Professor Elaine Bignell, a global authority on human fungal pathogen research, emphasises that fungi are responsible for numerous infections worldwide that result in significant mortality.

“There are numerous fungi infecting the brains of human beings all over the planet, often with devastating outcomes,” Professor Bignell told Sky News. She points out that some of the fungi mentioned in the show are on the World Health Organisation's (WHO) list of high-risk pathogens.

The WHO identifies Aspergillus fumigatus, a common mould found in homes and outdoor environments, as a cause of chronic and acute lung diseases, which can be fatal. Candida species, responsible for thrush and skin rashes, rank among the leading causes of bloodstream infections in intensive care units. Cryptococcosis neoformans, affecting immunocompromised patients by attacking lungs and brain tissue and causing pneumonia and meningitis, results in over 100,000 deaths annually, primarily in sub-Saharan Africa.

Professor Bignell elaborates on the unique challenge posed by these fungi: “One thing killer fungi do have in common is they are able to grow at human body temperature, and that's unusual for a fungus. Most fungi in the environment are suited to growing in more temperate conditions, and it places quite a strain on any microorganism to counteract an immune response in a human body and cope with the high temperature.”

Regarding cordyceps — the parasitic fungus central to the TV drama — experts confirm its existence, though its actual behaviour is restricted to insects rather than humans. Dr Mark Ramsdale, a molecular microbiology professor at the MRC Centre for Medical Mycology, explained: “There are about 600 species [of cordyceps]. They are predominantly insect pathogens. It's their insect host that they manipulate and change their behaviour. And so from that perspective, there is some basis there.”

Cordyceps fungi invade insects by releasing spores that penetrate their bodies, guiding them towards humid environments favourable for fungal growth before consuming the host and spreading spores further. Interestingly, cordyceps fungi have been utilised in various human applications such as traditional Chinese medicine, though there is no evidence they cause disease in people.

The discussion also touches on the influence of climate change on fungal threats. Both Dr Ramsdale and Professor Bignell underscored that rising global temperatures will exert profound effects on microbes, including fungi. There are estimated to be millions of fungal species on Earth, though only about 150,000 have been identified. Most currently cannot survive the human body's high temperatures, but ongoing environmental shifts could exert new evolutionary pressures, potentially enabling some fungi to become pathogenic to humans in ways not currently recognised.

Dr Ramsdale noted, “It changes the selection pressures that are put on those huge, diverse life forms. Perhaps some could potentially make that transition from one lifestyle to another and become pathogenic in a context we haven't thought of before.”

Nonetheless, Professor Bignell stressed that the scale and rapid spread of infections portrayed in The Last Of Us remain far removed from real-world possibilities. She remarked, “Some fungi can get passed from one person to the next – and in the environment we are exposed to them all the time – but it would take a very significant variant to be able to cause the sorts of species extinction event they're dramatising.”

While the dramatic depiction of a fungal pandemic transforming humans into aggressive beings remains fictional, the scientific community acknowledges that fungal infections in humans are a growing concern, particularly as a relatively recent phenomenon that has increased since the 1980s. There is also a noted lack of antifungal vaccine research, which leaves preparedness limited.

Professor Bignell emphasised the need for vigilance: “We have to be in a state of preparedness. We have to have a very good understanding of how different fungi can cause human diseases, how our immune systems cope with those microbes, and a good medicine cabinet with antifungal agents we know are effective.”

The Last Of Us continues to air weekly on Sky Atlantic, providing a fictional but thought-provoking lens on fungal infections and the implications of environmental change on human health.

Source: [Noah Wire Services](https://www.noahwire.com)

## References

* <https://wwwnc.cdc.gov/eid/article/30/3/23-0684_article> - This article discusses The Last of Us TV series’ concept of a cordyceps fungal pandemic and evaluates the scientific plausibility of such a fungal pandemic affecting humans, supporting the claim about the series' depiction and expert discussion on fungal pandemics.
* <https://netec.org/2023/05/02/distinguishing-between-fungal-fact-and-fiction-in-the-last-of-us/> - This source explains the distinction between the fictional portrayal of cordyceps fungi infecting humans in The Last of Us and the real biological behavior of cordyceps as insect pathogens, corroborating the detail about cordyceps fungi targeting insects and not humans.
* <https://www.news-medical.net/news/20240215/HBOs-The-Last-of-Us-fungal-apocalypse-science-fiction-not-future-reality.aspx> - This news report highlights the scientific viewpoint that the fungal pandemic scenario in The Last of Us remains fiction and not an imminent real-world threat, confirming expert statements about the dramatized nature of the infection scale and type portrayed.
* <https://www.who.int/news-room/fact-sheets/detail/fungal-diseases> - The World Health Organization’s fact sheet on fungal diseases outlines the high-risk fungi such as Aspergillus fumigatus, Candida species, and Cryptococcus neoformans, backing the article’s information about WHO’s identification of fungi responsible for serious human infections.
* <https://www.nature.com/articles/d41586-022-03222-5> - This Nature article discusses the challenges posed by fungal pathogens including their ability to grow at human body temperature and the potential impact of climate change on fungal evolution, supporting Professor Bignell’s comments on fungi’s temperature adaptability and climate-related microbial threats.