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Stay safe, stay healthy: Can plant pathogens make people sick?

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Introduction

The current COVID-19 pandemic underscores how unprepared we humans are in fighting zoonotic diseases: pathogens that originate in wildlife and jump to humans. Human immune systems are equally unprepared for drug-resistant diseases that jump from plants to humans. As we work to control and treat the current pandemic, we must simultaneously be thinking one step ahead—how we can avoid other pandemics in the future, without disrupting our food supply?

Human infection from plants is extremely rare, but it does happen. In most cases, the answer is no. The fungi, bacteria, viruses, and nematodes that cause disease in plants are very different from those that cause disease in humans and other animals. However, some plant pathogens could also be able to infect humans in addition to plants, and those that do tend to be "opportunistic pathogens," especially on a segment of the population at risk. For example, people with suppressed or compromised immune systems, taking certain medications or affected by medical conditions that causes human system to be weak (immunosuppressed).

Eating or touching infected plants or their parts wouldn't likely infect us with a similar pathogen that is making the plant sick. Though, consider that produce from

infected plants often have a flavor or texture very different from healthy fruit, so eating it may not be desirable anyway. Unless the disease is merely a superficial spot (such as sooty blotch and flyspeck on an apple), it is best to avoid diseased produce. Canning of symptomatic produce is not recommended. There are chances the acidity of the final product may change, resulting in spoilage or increased risk of undesirable conditions that may encourage microorganisms potentially harmful to humans to thrive in this new environment.

Plant Bacteria, Fungi and Fungal toxins.

Some examples of microorganisms that are reported to cause problems in humans and plants include some bacteria, fungi but also their products (toxins, etc). An example of this is the bacterium *Pseudomonas aeruginosa*, which causes a type of soft rot in plants. *P. aeruginosa* infections in humans can invade nearly any tissue within the physical body, provided they are already weakened. In people with compromised immune systems, this bacterium is understood to infect the urinary tract, lungs, blood, burns, and other wounds. It is especially common in hospitalized patients whose immune systems are compromised. To make matters worse, this bacterium is becoming increasingly antibiotic resistant in institutional settings. But wait! Before you run to the garden with a can of Lysol, remember that even in severely ill, hospitalized patients, the infection rate of *P. aeruginosa* is merely 0.4 percent, making it highly unlikely that you simply will ever develop an infection even though you've got open wounds that are available in contact with infected plant tissues.

Some fungi that live on decaying plants also can cause disease in humans. One example is *Sporothrix schenckii,* a fungus that often lives on dead rose thorns. This fungus can cause sporotrichosis, also called "rose-picker's disease", if it gets into a person's skin (such as through a scratch) into the lymph system, or if a person inhales its spores. Symptoms of this disease in humans can include problems with the lungs, eyes, central nervous system, bones, and joints. Additionally, some plant pathogenic fungi produce compounds that can be toxic to people, although the pathogen itself does not infect people. For example, some fungi that cause ear rots on corn, such as *Fusarium,* produce "mycotoxins" (toxins produced by fungi). The mycotoxins produced by *Fusarium* include fumonisins, zearalenone, and the aptly-named vomitoxin. Effects of mycotoxins in livestock that are fed contaminated grain can include development and reproductive problems, vomiting, general lethargy, and death, counting on the particular mycotoxin present and the level of contamination. *Aspergillus flavus* is a common contaminant of grain and peanuts, and it produces mycotoxins called aflatoxins. At very high levels (acute exposure), aflatoxins can cause vomiting, pain, convulsions, and death. At lower levels of longer duration (chronic exposure), they may leads to liver cancer. Over the past decade, drug-resistant fungal diseases have emerged as a serious health threat, including *Candida auris*—a highly infectious fungus

sweeping through hospitals across the world before the coronavirus crisis hit. Ten years ago, nobody had heard of C. auris. Today, it kills half those afflicted within 90 days, and the scourge has spread to 19 countries (and counting). But where did this fungus develop its drug resistance? One surprising theory: *C. auris* may have developed its resistance on farms, and not in hospitals.

Do Plant Viruses Make People Sick?

Unlike bacteria that can function in a very more opportunistic fashion, viruses need very exacting conditions to spread. Even if you eat fruits from your squash mosaic infected melons, you won't contract the virus responsible for this disease.

Conclusion

In general, pathogens that infect plants don't specialize in infecting people. You are unlikely to catch a disease from working with diseased plants in your garden, but it's a possible risk (depending on the infection), and consideration should be taken. Avoid eating moldy or rotten produce, though, as some fungi and bacteria can produce toxic compounds.

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