

## Agricultural Cyberbiosecurity

# Biosecurity

### Introduction

Plants and animals can get sick, just like you. The difference is that we can tell each other! So, it's up to us to keep plants and animals safe. We do this by ensuring that things that make them sick never get to them. This is called **biosecurity**. **Biosecurity** helps prevent **viruses, bacteria, fungi, and toxins** from spreading to people, animals, plants, and the environment. So, what do you do to avoid getting sick? You'll probably say things like washing your hands or wearing masks. This is **biosecurity**! Except, plants and animals can't wash their hands or wear masks. So, we need to be a little more creative.

### Key terms

- **Artificial intelligence:** Advanced computer systems that can perform tasks equally well or surpass human intelligence.
- **Cyber-physical attacks:** A security breach in cyberspace that influences the real world. (i.e., a hacker turning off a machine)
- **Invasive plants and animals:** A nonnative organism, such as a plant or insect, that causes ecological or economic harm to a region.
- **Strains:** A variety of bacteria. A recent example is the strains of COVID-19, which include Omicron, Delta, and Alpha, among others.
- **Vectors:** An organism that spreads disease, parasite, or other harmful pathogens to another organism

**Figure 1. Woman in a clean suit**



"File:Dress like a scientist in our clean suits (19889555815).jpg" by Science and Technology Facilities Council is licensed under CC BY-SA 2.0.

## Animal Biosecurity

When farmers raise animals, they usually put a lot of the same kind of animal together in the same place. This might be a chicken house, a horse barn, or a dairy farm. When a lot of animals live in one place, they can get sick more easily. This can be even worse if their living conditions are not clean. To stop this from happening, farmers can use different ways to keep animals from getting sick. They can make sure the place they live in is built in a way that stops germs from spreading, and they can keep the area clean.

This includes making sure that visitors are healthy. When farmers add new animals to their flock or herd, those animals might already be sick. That's why it's important to have rules like putting new animals in a separate area for a while. But what about you and me? We might have germs on our shoes without even knowing it. We might have to wash our hands or cover our shoes before we enter the farm. Different farms might have different rules to follow. For example, farms with chickens can easily get sick with diseases like bird flu. So people might need to wear special shoe covers and clothes to keep the animals' homes clean.

## Plant Biosecurity

Plants get sick a little differently. Things that get us sick can come from the air, water, and food we eat. Things that get plants sick are in the water, dirt, and from bugs that snack on them. Another big difference is that animals can move away from things that make them sick. Plants can't so we need to be creative. Things that go onto the farm, like cars, tractors, and animals get cleaned. They might bring harmful bacteria in on their tires, feet, or hooves. Bugs need to be watched carefully. Some new bugs are good at eating our plants. Sometimes new bugs are accidentally brought into an area. These are called **invasive species**.



**Figure 2. Apple rust-infected leaf**

"Rose apple rust caused by *Puccinia psidii*" by Plant pests and diseases is marked with CC0 1.0.

## Link to Cyberbiosecurity

Using tools like computers help us to keep our plants and animals safe. If a computer can do it, we don't have to visit. This lowers the chance of bringing bugs, germs, and other harmful things onto our farms. But those computers need to be overseen. If the computers aren't working correctly, they can cause more harm than good. So, we need to understand our computers, data safety, and animals to keep our farms happy and healthy.

## Career connections

Animal Health & Welfare  
Biotechnology  
Foreign Affairs  
Business, Management, &  
Administration  
Information Technology  
Plant Health  
Wildlife Management

Did you know? The College of Agriculture and Life Sciences at Virginia Tech has nearly 70 program options! Find your career connections at [cals.vt.edu](https://cals.vt.edu) or email [applytoCALS@vt.edu](mailto:applytoCALS@vt.edu)



## CAIA

### Scientist Spotlight

**Dr. Alexis Hamilton** is an assistant professor at Virginia Tech. he works on research projects and extension activities across Virginia, including projects that blend science with education. Her work in the lab focuses on keeping the foods we eat safe from contamination from bacteria that make us sick after eating them. These are called foodborne pathogens. When I am not in the lab, I am educating people about food safety practices, helping food companies make safer food, and collaborating with food safety professionals across the country to develop research ideas and educational materials.



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# Acknowledgements

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