Agricultural Cyberbiosecurity

Bioeconomy

Introduction

How much money are all the apples in the United States worth? Have you ever had a thought like this? When you eat an apple, you might know how much it cost. But how much money do all the apples grown in the United States cost? Let's think about it.

There are fresh apples, there are dried apples, apples used for juice, and apples used for jams, pie filling, and preserves. All these forms of apples equal almost 1 billion dollars! That's a lot of money, but do we stop there? What about new farming jobs because of apples? What about apple research? When we consider the economic impact of farming, biotechnology, computer science, and engineering, we're talking about the **bioeconomy**.

Key terms

- **Biotechnology**: The application of biology to an industrial process
- **Stakeholder**: A stakeholder is a group of people or entities that affects the success or failure of a business
- **Intellectual property**: A unique idea that someone could apply for protected rights.

Figure 1. Apples products

"Apple Products- Atkins Farms, Amherst" by Massachusetts Office of Travel & Tourism is licensed under CC BY-ND 2.0.

The bioeconomy isn't just about apples, it includes all the hard work that scientists, farmers, and computer engineers put into their work that helps plants, animals, and microbes grow.

There are three main areas within **the bioeconomy: agriculture, bioindustry, and biomedicine.**

People from all different careers can contribute to this. For example, the people who created the COVID-19 vaccine. Many different people, including people from the government, schools, and companies, worked together to create the vaccine. Since COVID-19 is a virus, all of this can be considered part of **bioeconomy**.

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What's so important about the bioeconomy?

Scientists use a lot of data to make the things we use every day. In the **bioeconomy**, a lot of this data is from living people, plants, and animals. Computers need to be protected to keep this data safe. This is why more computer scientists and cybersecurity experts are getting more jobs in **agriculture**, **biomedicine**, and the **bioindustry**.

Agriculture

Farming is a very important part of the bioeconomy. Making new plant types, understanding data, and growing and harvesting food are all important parts of farming's role in this. This helps farmers to grow more food and take better care of their animals.

Medicine

Medicine is its own part of the **bioeconomy** called **biomedicine**. **Biomedicine** is made with germs and natural processes. The COVID-19 vaccine is an example. The vaccine is made through a natural process found in cells. Scientists used computers to figure out how the cells work. Then they made medicine that works with the cells. Medicine inspired by the way cells work is part of the **bioeconomy**.

Chemistry

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Technology

Technology is playing a bigger role in farming. One way this is happening is with new tractors. Tractors use **sensors** to collect data. Data on soil, the number of plants, and on time driving around. This helps farmers make better decisions on their farms.

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Career connections

Computer Science
Agriculture
Biotechnology
Engineering
Medicine

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 or email applytoCALS@vt.edu

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Additional Resource:
https://research.cnr.ncsu.edu/sustainablebioproducts/resources/bioeconomy-careers/

CAIA Scientist Spotlight

Dr. Tiffany Drape is an Assistant Professor in Agricultural, Leadership, and Community Education at Virginia Tech. She uses social science research methods to investigate issues of equity and access in agriculture and the life sciences. Her research revolves around formal and informal education, cyberbiosecurity in agriculture and the life sciences, and inclusive pedagogy. Tiffany is a CAIA Affiliate Faculty.

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This definition of OER is provided by The William and Flora Hewlett Foundation.

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The main landing page for these resources is https://doi.org/10.21061/cyberbiosecurity.

This page includes a downloadable and editable Word document for the:

- Student fact sheet
- Student activity sheet
- Facilitator's guide

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