

Preparing the Next Generation of Sustainable Agriculturists: Developing Online Learning Modules about Biochar for Agricultural Educators



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Introduction

The Pennsylvania Envirothon Inc. (2019) suggested, “Agricultural sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs” (p. 5).

With an increased focus on environmental risks, many companies are also shifting to a greater sustainability focus (Ateeq & Ibrahim, 2024).

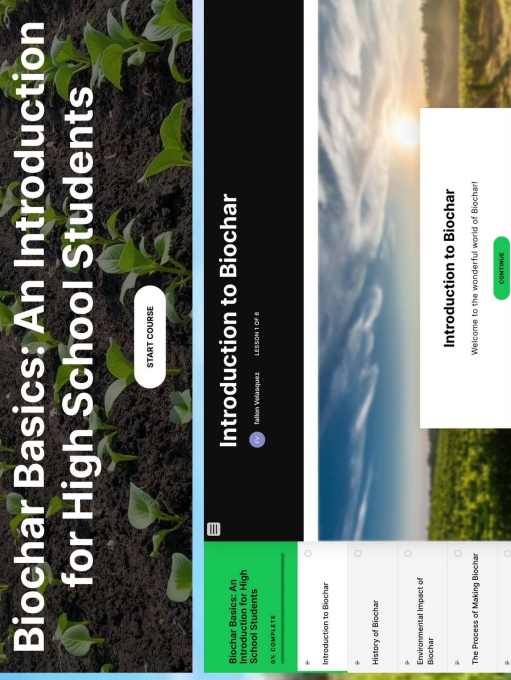
Biochar is a carbon-rich material that is produced by heating biomass with little to no oxygen with a process called pyrolysis (Rajakumar & Sankar, 2016). It is used as a soil additive to enhance nutrient availability, water retention, and the overall health of plants.

Educational opportunities play a key role in preparing the next generation of farmers, scientists, environmentalists, and consumers. As a result, real-world examples showcasing varying needs in a changing agricultural system are needed (Kórnives et al., 2019).

The purpose of this NSF project is to provide educational resources and materials related to biochar for agricultural educators.

Costs and Resources

- These modules are free for educators and students.
- For future creators, we used an Articulate Rise subscription to design the modules.
- Some institutions may have a university or team subscription to Articulate, which could save some cost.



Results

- Educators appreciated the interactivity that Articulate Rise 360 provided and noted the varying learning approaches.
- The advisory board noted the modules were user-friendly and attractive.
- We are working to make the modules more accessible for different learning needs.

Advice to Others

- We recommend that teachers implement these modules in units related to natural resources or conservation.
- Teachers could use these modules as substitute lesson plans, as the modules are designed to be student-led and self-paced.
- These lessons may also be of interest to parents or guardians of homeschooled students.
- The supplemental activities can help reinforce learning if used.

Program Phases

- 01 We designed 10 online modules in Articulate Rise to reinforce students' understanding of sustainable agriculture practices. We designed the unit to be self-led, where the modules should be completed in sequence.
- 02 The module topics range from an introduction of biochar, how it works, the process of making biochar, its impact on water retention, financial concerns, and others.
- 03 The modules provide detailed instructions, learning objectives, and learning activities.
- 04 At the end of each module, students will complete a “knowledge check” consisting of summative questions.
- 05 Each module also includes an assignment bank with at least five assignments for teachers to use at their discretion.

Future Plans

- Future plans include completing usability testing with an advisory board of subject matter experts and agricultural educators.
- We will also investigate relevant learning standards to place at the front of each module for teachers to include in their administrative lesson plan notes.
- Ultimately, our goal for creating and publishing a self-paced unit including biochar was designed to cultivate a mindset around sustainability for youth to think outside the box for agricultural innovations and promote lifelong learning skills.

Acknowledgements

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