

Students try to grow plants on Mars-like soil

By Milwaukee Journal Sentinel, adapted by Newsela staff on 11.12.15

Word Count **878**



UW-Stout student Molly Beaghan of Houghton, Michigan, waters plants in the "Hab," or habitat, which contains Chippewa County soil. The soil turned reddish after it was heated to 1,000 degrees Fahrenheit to decompose the organic material. Brett T. Roseman/UW-Stout

MILWAUKEE, Wis. — Thanks to two professors from the University of Wisconsin-Stout, some lucky students are getting a truly out-of-this-world experience.

The professors, one a geologist and the other an ecologist, re-created the dusty surface of Mars to help their students better learn about life on the planet. They constructed an area to resemble Mars in a dirt lab and a greenhouse on the university campus. Their goal was to help students explore the plot of "The Martian," Hollywood's blockbuster space movie about what it takes to support life and grow food on Mars.

To recreate the surface, the professors gathered about 400 pounds of glacial subsoil from nearby. They cooked the soil at 1,000 degrees for about two hours to kill off all life-sustaining organic materials.

Then they challenged their students to figure out what to add so potatoes could grow in the reddish-orange soil. This particular soil was lacking in the good stuff that soil on Earth naturally contains, similar to what Mars is really like. One group of the students were in a soil science and conservation class.

Tackling Complex Problems

This was a hands-on experience by all accounts. Students didn't learn by memorizing facts and definitions of soil science. Rather, they tackled a complex problem that required them to apply critical thinking to foundation knowledge in order to find solutions. Then they played the what-if game as they began to understand how all the pieces fit together.

"It's like taking a fun toy apart to see how it works, and then putting it back together," said Matt Kuchta, a UW-Stout professor of biology and geologist who teaches the soil science and conservation class.

"The Martian," starring Matt Damon as an astronaut stranded on Mars, is a hit in the movie theaters across the country. It's based on a 2011 science fiction novel by Andy Weir. And while the elaborate technical details are accurate, the parts about the wind on Mars are fiction.

While Mars is famous for being inhospitable for any kind of life, the astronaut in the movie is a resourceful botanist who figures out how to grow food in a covered habitat with every bit of bio-matter he can find. He uses various things, from food scraps to his own waste, combined with a little bit of water. His goal is to survive until he can be rescued.

Kuchta, the professor, started reading the book the movie is based on last January, and quickly realized the plot was almost entirely based on soil science.

"One of the goals for the human race is to explore and view other worlds," Kuchta said. "It struck me as a perfect theme to help students understand concepts of soil science, and not just rural agriculture. It's important if we want high yields of corn or soybeans, but understanding the soil system also is important to manage a forest or conserve a prairie habitat."

Simulated Martian Soil ... From Chippewa County

Kuchta actually got the idea to simulate the soil on Mars from his father, a high school biology and chemistry teacher with an environmental science background. Kuchta took his advice to use glacial subsoil locally from Chippewa County, which he then sterilized with high temperatures. The subsoil is soil from below the surface, consisting of sand, gravel, silt and clay dropped by melting glaciers tens of thousands of years ago.

Mandy Little, a professor of biology who is married to Kuchta, also helped with the experiment.

Her students added composted garden soil from decayed organic matter, like vegetables or leaves, to the "Martian" soil in an attempt to grow potatoes. They faced many challenges, including the fact that many of the potatoes rotted because of diseases in the composted soil.

The class started with a clean slate and watched how plants extract water from the soil; how microorganisms interact with organic and mineral components of soil; and what kinds of minerals are present and provide important nutrients for plant life.

"It's all about understanding how the system works and being able to make predictions based on how the soil system will respond to various changes," Kuchta said.

Everything Is Connected

Earth's soil system is interconnected with the biosphere in which living organisms are found. Gases are exchanged between the soil and the atmosphere, and rain in the atmosphere has an impact. These different elements can break down fragments of rocks and minerals in the soil system, which then connects to geology.

Some students suggested adding hair to the soil because that's something that would be available to someone isolated on another planet. They also thought about adding food scraps and bits of clothing.

They didn't use human waste to fertilize the soil, like in the movie. Instead, they used worm droppings called casings.

Making Science Accessible

The first class assignment was to read the first chapter of the book online. The professors also showed their classes the trailer for "The Martian" movie.

"I want them to be interested in science and have it be accessible," Little said.

Scientists don't have all the answers when they first tackle a problem. Seeing firsthand how scientists do research, develop theories and make informed decisions about their work with limited information, helps students understand the role science plays in society, she said.

Quiz

- 1 Which opinion would the scientists in the article be MOST LIKELY to agree with?
 - (A) Teachers should always use insights from movies to teach students.
 - (B) Students never learn from books; they need real-world experiences to learn.
 - (C) If you design an experiment correctly from the beginning, you will be successful with your result.
 - (D) The best way to learn science is by investigating real problems like scientists do.

- 2 Read the selection from the article.

Thanks to two professors from the University of Wisconsin-Stout, some lucky students are getting a truly out-of-this-world experience.

Which of the following can be inferred from the selection above?

- (A) The article describes a practice that is actually quite commonplace in schools.
 - (B) The article describes a practice that should not be allowed in schools.
 - (C) The article describes a practice that is unusual in schools.
 - (D) The article describes a practice that is controversial, but ultimately good for the students.
- 3 Read the selection from the article.

While Mars is famous for being inhospitable for any kind of life, the astronaut in the movie is a resourceful botanist who figures out how to grow food in a covered habitat with every bit of bio-matter he can find.

Which of the following could BEST replace the word "inhospitable" above?

- (A) friendly
 - (B) difficult
 - (C) rude
 - (D) thoughtful

- 4 Read the selection from the article.

Kuchta actually got the idea to simulate the soil on Mars from his father, a high school biology and chemistry teacher with an environmental science background. Kuchta took his advice to use glacial subsoil locally from Chippewa County, which he then sterilized with high temperatures.

Which answer choice is the BEST substitute for "simulate" as used above?

- (A) fertilize
- (B) clean
- (C) recreate
- (D) improve

Answer Key

- 1 Which opinion would the scientists in the article be MOST LIKELY to agree with?
- (A) Teachers should always use insights from movies to teach students.
 - (B) Students never learn from books; they need real-world experiences to learn.
 - (C) If you design an experiment correctly from the beginning, you will be successful with your result.
 - (D) The best way to learn science is by investigating real problems like scientists do.**

- 2 Read the selection from the article.

Thanks to two professors from the University of Wisconsin-Stout, some lucky students are getting a truly out-of-this-world experience.

Which of the following can be inferred from the selection above?

- (A) The article describes a practice that is actually quite commonplace in schools.
- (B) The article describes a practice that should not be allowed in schools.
- (C) The article describes a practice that is unusual in schools.**
- (D) The article describes a practice that is controversial, but ultimately good for the students.

- 3 Read the selection from the article.

While Mars is famous for being inhospitable for any kind of life, the astronaut in the movie is a resourceful botanist who figures out how to grow food in a covered habitat with every bit of bio-matter he can find.

Which of the following could BEST replace the word "inhospitable" above?

- (A) friendly
- (B) difficult**
- (C) rude
- (D) thoughtful

- 4 Read the selection from the article.

Kuchta actually got the idea to simulate the soil on Mars from his father, a high school biology and chemistry teacher with an environmental science background. Kuchta took his advice to use glacial subsoil locally from Chippewa County, which he then sterilized with high temperatures.

Which answer choice is the BEST substitute for "simulate" as used above?

- (A) fertilize
- (B) clean
- (C) recreate**
- (D) improve