

Developing hardier, weather-resistant crops

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At first, the back room of plant physiologist Edgar Spalding's lab at the University of Wisconsin-Madison might be mistaken for an alien space ship set straight out of a Hollywood movie. It's a room bathed in low-red light with camera lenses pointing at strange looking entities encased in Petri dishes.

A closer inspection reveals the [Petri dishes](#) contain nothing alien at all, but rather very down-to-earth corn seedlings. They're grown in red light for optimal growth. They're just one of the plants featured in thousands of time-lapse movies Spalding has created over the past five years. The goal: figure out how to grow crops optimally suited to survive, and thrive.

"We can't hope to improve a plant unless we understand it well," says Spalding. With support from the National Science Foundation (NSF), Spalding is exploring just what makes plants tick. He says the key is to study the function of each of the thousands of genes that make up the plants' DNA. "One way to do that is to collect images of those plants that have those genes altered in some way. And by measuring how those plants grow and develop differently," says Spalding.

"We are able to infer the function of the gene that's been manipulated," he continues. Researchers have created thousands of genetically different [corn plants](#). Spalding uses specially rigged cameras to snap pictures every 30 seconds or so of the plants' roots as they grow.

He also uses a six-foot high [robotic camera](#) that's capable of shooting

dozens of roots at once. "We have made hundreds of thousands of measurements from thousands of different plants. Let's say we had a ruler, we'd probably be on number two... maybe," he says with a chuckle. The time-lapse movies are loaded into a computer and an algorithm measures cellular growth rates in the root with pinpoint accuracy, as well as the angle and curvature of the root tip.

"By using this so-called [computer vision](#) or [machine vision](#) to track [the plants] growth and development, we can get at the genes that control root growth and those hopefully will have fundamental importance to crop improvement. It lays the foundation for discoveries that will help improve [plants](#) for human purposes."

Spalding is sowing the seeds for better crops of the future. It's an idea he thinks is worth growing.

Provided by National Science Foundation

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