# Scientists urge new approaches to plant research

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You'd be amazed at how much you can learn from a plant.

In a paper published this week in the journal *Science*, a Michigan State University professor and a colleague discuss why if humans are to survive as a species, we must turn more to plants for any number of valuable lessons.

"Metabolism of plants provides humans with fiber, fuel, food and therapeutics," said Robert Last, an MSU professor of biochemistry and molecular biology. "As the human population grows and nonrenewable energy sources diminish, we need to rely increasingly on plants and to increase the sustainability of agriculture."

However, Last and co-author Ron Milo of the Weizmann Institute of Science point out that despite decades of plant genetic engineering, there are relatively few types of commercial products originating from this body of work.

"This is in part because we do not understand enough about the vastly complex set of metabolic reactions that plants employ," Last said. "It's like designing and building a bridge armed only with satellite images of existing bridges."

The authors say that perhaps the best approach is to bring together a variety of disciplines – not just plant scientists – to study how plants operate.

They also suggest looking hard at what brought plants to the place they are today – evolution.

"We think that understanding design principles of plant metabolism will be aided by considering how hundreds of millions of years of evolution has led to well-conserved examples of metabolic pathways," Last said.

One of the amazing aspects of plant metabolism is this: It must continuously strike a balance between evolving to meet an ever-changing environment while maintaining the internal stability needed to carry on life as it knows it.

In addition, the authors point out that plants experiment with specialized (also called secondary) metabolism which can produce novel chemicals that are used to defend against pathogens and herbivores.

"Humans benefit from this 'arms race' because some of these compounds have important therapeutic properties," Last said. "Unfortunately, design principles are not so well studied in these rapidly evolving metabolic processes. Using new approaches, including considering optimality principles, will lead to advances in medicinal chemistry as well as creating more and healthier food."

Last is Barnett Rosenberg chair of Biochemistry and Molecular Biology and Plant Biology. Co-author Milo is a professor of plant sciences at Israel's Weizmann Institute of Science.

Provided by Michigan State University