

The future of plant science -- a technology perspective

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Plant science is key to addressing the major challenges facing humanity in the 21st Century, according to Carnegie's David Ehrhardt and Wolf Frommer. In a Perspective published in *The Plant Cell*, the two researchers argue that the development of new technology is key to transforming plant biology in order to meet human needs.

Plants serve as the conduit of energy into the biosphere, provide food and materials used by humans, and they shape our environment. According to Ehrhardt and Frommer, the three major challenges facing humanity in our time are food, energy, and [environmental degradation](#). All three are plant related.

All of our food is produced by plants, either directly or indirectly via animals that eat them. Plants are a source of energy production. And they are intimately involved in [climate change](#) and a major factor in a variety of environmental concerns, including [agricultural expansion](#) and its impact on habitat destruction and waterway pollution.

What's more, none of these issues are independent of each other. Climate change places additional stresses on the food supply and on various habitats. So plant research is instrumental in addressing all of these problems and moving into the future.

For plant research to move significantly forward, Ehrhardt and Frommer say technological development is critical, both to test existing hypotheses and to gain new information and generate fresh hypotheses. If we are to

make headway in understanding how these essential organisms function and build the foundation for a sustainable future, then we need to apply the most advanced technologies available to the study of plant life, they say.

They divide the technology into three categories: existing technology that isn't being applied for all of its potential uses, new readily envisioned technology, and technology we'd like to have but don't know how to create.

The technological overview includes expanding existing technologies such as DNA sequencing, RNA cataloguing, mass spectroscopy, fluorescence-based microscopy, and electron microscopy, among many others. A key focus is on the advances possible through advanced imaging technologies.

Ehrhardt and Frommer point out that many of the most often-cited academic papers related to the development new technology, demonstrating the interest of the scientific community.

"We certainly expect that new technologies will continue to revolutionize biological research," they say. "[Plant science](#) has not often been the driver of innovation but often enough has profited from developments made in other areas."

Provided by Carnegie Institution

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