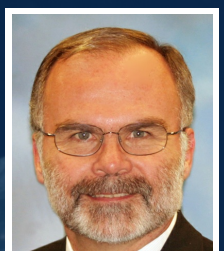
Understanding Plant Gas Exchange for Improved Crops and a Cleaner Atmosphere



Thomas D. Sharkey

CURRENT RESEARCH

Understanding the gas responsible for both plant resilience and air pollution

Photosynthesis underlies human existence. Understanding how this process copes with large environmental changes—such as shifts in temperature and ozone—leads to the improvement of engineered crops with growth-promoting properties. Thomas D. Sharkey, Distinguished Professor of Biochemistry and Molecular Biology at Michigan State University (MSU) is a global leader in the study of gas exchange between plants, the atmosphere, and microbes. His lab focuses on alternative routes of carbon dioxide (CO_2) fixation in photosynthesis metabolism and the production of photosynthetic isoprene—an organic gas compound—by trees. Though it is the single largest input of hydrocarbon into the atmosphere and can contribute to toxic ozone, isoprene protects plants against environmental stress. Understanding why certain plants emit isoprene and its effect on the atmosphere will lead to both more resilient crops and the mitigation of air pollution.

Isoprene has very large effects—both positive and negative—on atmospheric chemistry. Isoprene can contribute to air pollution in cities. The negative effects occur when nitric oxide and nitrogen dioxide (NOx), produced by cars and gas or coal-burning power plants, are present. Dr. Sharkey is very interested in looking at the hard questions regarding environmental stewardship. Presidential candidate Ronald Reagan suggested that trees pollute and so regulations to keep the air clean were not justified. It is true that trees emit more hydrocarbon into the atmosphere than people, but Los Angeles air or Beijing air does not look that way because of the trees. Nevertheless, *we need to understand the trees we hug.*

Dr. Sharkey, with his team of undergraduate, graduate,...

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AFFILIATION

Michigan State University

EDUCATION

- Ph.D., Botany and Plant Pathology 1979,Michigan State University

AWARDS

- Listed in Who's Who in America and American Men and Women of Science
- Kellet Mid-Career Award for Research - UW-Madison, 1999
- Thompson Reuters/ISIHighlyCited, 2001
- Fellow of ASPB, 2007
- Fellow of AAAS, 2011
- and 2 more...

RESEARCH AREAS

Environment, Atmospheric / Space, Clean Energy

FUNDING REQUEST

Your contribution will help fund Dr. Sharkey's continued research on the exchange of gases between plants and the atmosphere. $300K/year supports his research lab. Costs include $3K/mo for supplies, $10K for one RNA genomics experiment, $40K for one graduate student, $60K for one post-doctoral researcher, and $75K for a lab manager. Play a role in identifying isoprene in plant resilience and hydrocarbon emissions in the atmosphere; fund Dr. Sharkey.