



The Shift

MEET THE CHANGE MAKER



Dr. Jim Ippolito

PROFESSOR OF SOIL SCIENCE, OHIO STATE UNIVERSITY
BIOCHAR & ENVIRONMENTAL REMEDIATION RESEARCHER

From Cornfields to Contaminants: Riding the Biochar Wave Across Agriculture, Mining, and PFAS.

When Dr. Jim Ippolito talks about his career, he often frames it in waves. “I’ve caught a research wave two or three times over my career,” he says. “With biochar, I’m still riding it nearly 20 years later.”

Jim’s journey into soil science began at the University of Delaware, where a single professor’s passion for soils captured his imagination. He went on to earn his master’s and PhD in soil chemistry and environmental quality from Colorado State University. His career included a decade with the USDA Agricultural Research Service, where he was first introduced to biochar around 2007–2008, just as U.S. research interest in the topic reached a fever pitch.

Since then, he has become a leading voice in soil chemistry, mine reclamation, and biochar-based remediation. Now a professor at The Ohio State University, Jim balances research, teaching, and mentoring a new generation of scientists. “I have some really great students,” he says. “Their passion for learning keeps me going.”

“I have some really great students. Their passion keeps me going.”



From big ag skepticism to niche solutions.

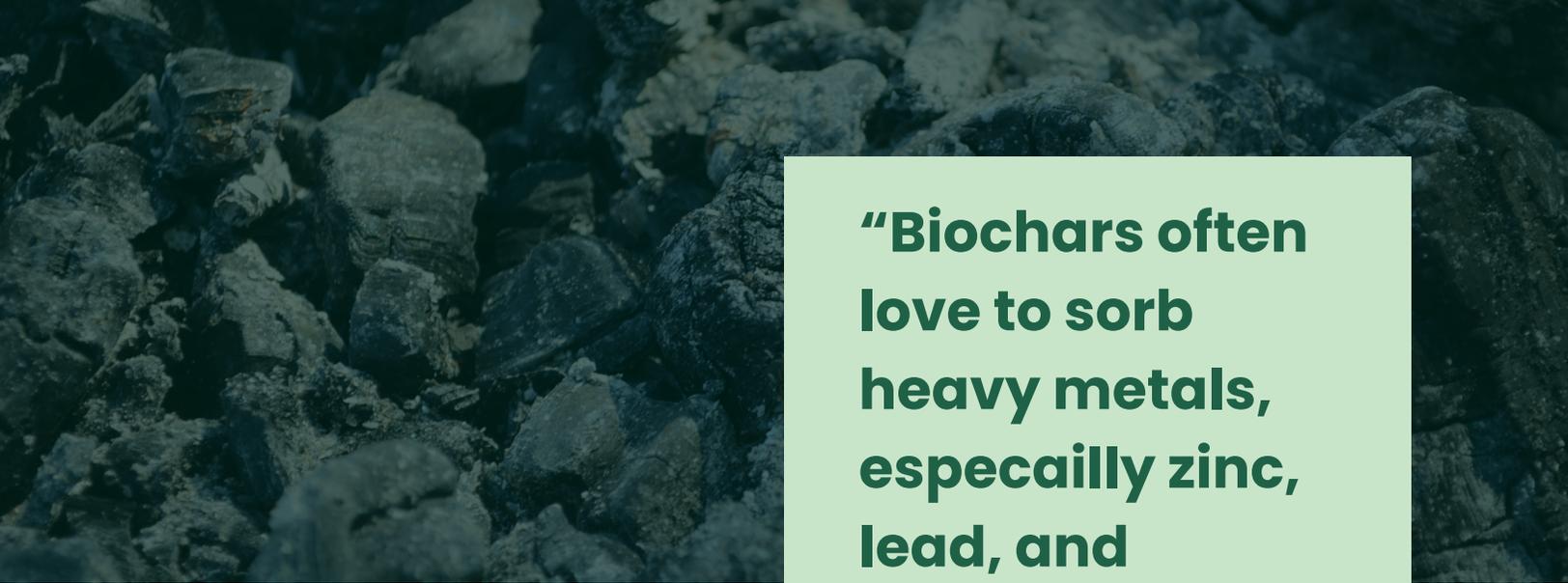
Jim is candid about the limitations of biochar. In large-scale agriculture, he argues, the economics often don't add up. "For a producer farming 30,000 acres, applying one or two tons of biochar per acre is simply cost-prohibitive," he explains. "It doesn't belong in big ag."



"For a producer farming 30,000 acres, applying one or two tons of biochar per acre is simply cost-prohibitive."

Instead, his work has focused on niches where biochar can deliver measurable impact: reclaiming mine lands, immobilizing heavy metals, and addressing emerging contaminants like PFAS. These applications, he says, are where biochar shows its true promise.





“Biochars often love to sorb heavy metals, especially zinc, lead, and nickel.”

One of Jim’s major research areas has been biochar in mine tailings and contaminated soils. He’s worked across the U.S. from Missouri to Colorado to Oregon and with collaborators in China to test how different biochars perform under extreme conditions. “Biochars often love to sorb heavy metals, especially zinc, lead, and nickel,” he explains. “Cadmium is trickier; it can sorb and desorb, but for many metals, biochar can reduce bioavailability and help kickstart reclamation.”

More recently, Jim has extended this work to PFAS, the “forever chemicals” drawing increasing public concern. He and his team are screening over 50 biochars to test their ability to adsorb PFAS, with plans to take the most promising candidates from lab trials to greenhouse studies and eventually field-scale projects. “This is where the research is heading,” he says. “It’s challenging, but exciting.”



Soil systems, health, and surprises.

Jim's research spans both chemistry and ecology, often revealing unexpected results. Early in his biochar work, he observed nitrogen deficiencies in corn, effects that only appeared in the second year after application. "If I was a farmer who just saw a 50% yield hit, I'd be upset," he admits. "But by year three, yields bounced back. These are the complexities we need to understand."

He has also seen biochar act as a slow-release fertilizer, sorbing nutrients and gradually making them available to plants. Other experiments highlighted biochar's electronegative properties, which could potentially change iron chemistry in soils and increase its availability. "Some of these results were surprising even to me," he says.

The blockers to progress.

For Jim, the barriers to scaling biochar are less about science and more about systems. Regulatory hesitation, economic costs, and disconnects between academia and industry all play a role. "Scientists like me tend to work at small scales," he says. "But the real impact will come when industry and academia work together to solve problems at scale."

He's critical of what he calls "Pilot Purgatory" where promising studies never transition into field-scale applications. His vision is for industry partnerships to accelerate this leap, using screening tools and smart trial designs to move from lab to landscape.

A pragmatic changemaker.



Asked why he hasn't stepped off the biochar "wave" despite the challenges, Jim is quick to credit both his students and the urgency of the problems he's tackling. From reclaiming mine sites to exploring biochar's role in PFAS remediation, his work remains deeply rooted in real-world environmental needs. "I thought I was done with biochar," he reflects, "but every time I try to leave, another wave pulls me back in."

"I thought I was done with biochar, but every time I try to leave, another wave pulls me back in."