# Insects are the foundation of planetary stability

*by Dr. Adam Martinez, Senior Scientist, Insect Discovery Lead*

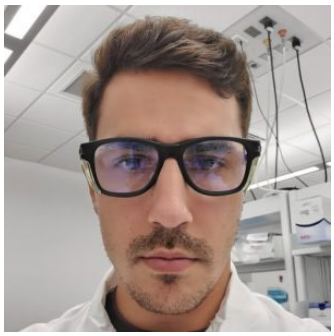
Our modern relationship with insects may seem complicated, but way before us there were plants. Insects and plants comprise two of the first and most successful groups of organisms to colonize land on earth and, for nearly 500 million years, both have been inextricably tied to each other (for better or for worse)[1]. In order for insects and plants to become such huge successes, however, they used those millions of years to coevolve special adaptations for their coexistence[2]. Understanding the complex relationships between insects and plants is crucial if we hope to remain successful in our agricultural endeavors.

Most people understand that insects like honeybees are important for gardening and agriculture. Generally, however, people mostly associate insects with mysterious critters that invade our homes, cause diseases, or cause damage in the garden, despite these only representing a tiny fraction of the millions of species of insects. In fact, insects that cause ecological issues are often due to their introduction by humans in places where they don't belong.

It is really about time that we change perception into one that emphasizes importance of the overwhelming majority of insects to ecological stability, human health, and a potential wealth of unexplored natural products. While most people recognize the crucial role insects play to help plants reproduce, lesser-known functions of insects include: cleaning our forests, eating pests, helping us make some of our favorite foods, and developing products for use in modern technology and medicine[3,4,5].

So how did we come to consider insects as the enemy in the first place? We began to develop agriculture about 10-15 thousand years ago[6]. Given their long history with plants, insects were extremely well prepared to take advantage of our huge swaths of cultivated food plants. We discovered insects' favorite foods, bred those plants to be more nutritious for ourselves, and placed them all in one convenient location for insects to eat. As a result, we've also had to combat insects with pesticides that are sometimes too effective and harm beneficial insects like pollinators, predators, and keystone species. This broad elimination of insects is no longer acceptable in modern agriculture. We need a better and more targeted approach!

Invaio's approach of utilizing modern research to develop novel delivery systems and targeted crop-protection has attracted a diverse assemblage of Entomologists, Plant Scientists, Microbiologists, Computer Scientists, Bioinformaticians, Biochemists, Software Engineers, Mechanical Engineers, and Medical Researchers from both academic and industry backgrounds. Together, our challenge is to actively produce new technologies that deliver our solutions directly to the plants that need them while avoiding unintended harm to insects and other organisms that not only benefit us, but are also important to healthy natural systems.



Dr. Adam Martinez began as an Entomologist/Molecular Scientist at Invaio's Cambridge, MA location in 2018 before transitioning to the RTP, NC site in 2020 to help the company expand and advance product development. Adam is currently the Insect Discovery Project Lead and he and his peers work to develop new, safer, sustainable, and modular methods for targeting insects and other pests in agricultural systems. His research incorporates efforts from all corners of Invaio and includes next generation sequencing, computational structure modeling, machine learning, *in vitro* assays, and insect bioassays.

In a past life, Adam combined molecular techniques, genomics, bioassays, and field research to study the evolutionary and ecological interactions between insects and their symbiotic bacteria. Overall, he enjoys studying insects and likes to incorporate all aspects of their general biology into his research.

**References**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