

Advancing understanding of plant cuticle-fungicide interactions

Background

Agricultural crops are exposed to fungal diseases which are controlled by synthetic and biological fungicides. The focal point of the potential project is the cuticle of agricultural crops, which serves as the initial point of contact between fungal pathogens and the fungicide. The interaction between an active ingredient and the cuticle is believed to have an impact on the effectiveness and duration of disease control. We aim to increase our understanding of the following two key aspects.

1. How the composition (e.g., waxes, cutin) and structure (e.g., thickness, porosity) of plant cuticles influence the behavior/ kinetics of fungicide compounds on and in the plant.
2. The behavior of fungicides on the cuticle such as binding, accumulation, transport and metabolism of fungicides (ADME, i.e. absorption, distribution, metabolism and excretion) after being sprayed on plants.

What we're looking for

We are looking to advance our understanding of how plant cuticles interact with fungicides and influence their behavior. We seek support from your expertise in plant physiology, plant biochemistry/ lipid biosynthesis, analytics (LC, GC MS) with a scientific focus or interest in the cuticle of terrestrial plants or in applied agricultural research. We are keen on developing, implementing, and utilizing methods and techniques at both laboratory and greenhouse scales. Our primary interest lies in agricultural crops, particularly wheat and soybean, but we are open to incorporating findings from non-agricultural crops as well.

Solutions of interest include:

- Methods to assess lipophilic molecule transport in soybean & wheat cuticles
- 3D-structural modeling of the cuticle
- Experimental approaches to observe/analyze transport processes in the cuticle/epidermis of plants
- Predictive models to evaluate fungicide kinetics and cuticle behavior

Our must-have requirements are:

- Understanding of plant biochemistry, role and functionality of long chain fatty acids (LCFA) and other components of the plant cuticle/epidermis
- Access to suitable imaging techniques for analyzing plant parts

Our nice-to-have's are:

- ADME (adsorption, distribution, metabolism and excretion) uptake studies using agricultural plants (transfer from model plants to crops should be feasible)
- Plant cuticle research (analytics, components, functionality) and data on transport processes of small molecules in plants
- Leverages analytical techniques (e.g., GC, LC-MS)

Acceptable technology readiness levels (TRL): Levels 1 - 5

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you

Eligible partnership models:

- Co-development
- Sponsored research

Benefits:

Sponsored Research

Funding is proposal dependent, up to \$100-150K total for up to 12 months.

Expertise

Partners will have access to internal team/experts as appropriate.

Facilities and Services

Partners can send samples for analysis to our facilities.

Reviewers

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Technology Scout

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Collaboration & Scouting NA

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Please contact the University of South Florida Technology Transfer office representative for submission - Karla Schramm at kschramm@usf.edu