A high-throughput chemical screen for resistance to *Pseudomonas syringae* in Arabidopsis

The study of plant pathogenesis and the development of effective treatments to protect plants from diseases could be greatly facilitated by a high-throughput pathosystem to evaluate small-molecule libraries for inhibitors of pathogen virulence. The interaction between the gram-negative bacterium *Pseudomonas syringae* and *Arabidopsis thaliana* is a model for plant pathogenesis. However, a robust high-throughput assay to score the outcome of this interaction is currently lacking. In this study, they demonstrated that Arabidopsis seedlings incubated with *P. syringae* in liquid culture display a macroscopically visible 'bleaching' symptom within 5 days of infection. Based on these observations, they have devised a high-throughput liquid assay using standard 96-well plates to investigate the *P. syringae*–Arabidopsis interactions.

Article

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Summary

Arabidopsis seedlings 'bleaching' symptom is associated with a loss of chlorophyll from cotyledonary tissues, and is correlated with bacterial virulence. Gene-for-gene resistance is absent in the liquid environment, possibly because of the suppression of the hypersensitive response under these conditions. Importantly, bleaching can be prevented by treating seedlings with known inducers of plant defense, such as salicylic acid (SA) or a basal defense-inducing peptide of bacterial flagellin (flg22) prior to inoculation. An initial screen of small molecules active on Arabidopsis revealed a family of sulfanilamide compounds that afford protection against the bleaching symptom. The most active compound, sulfamethoxazole, also reduced in planta bacterial growth when applied to mature soil-grown plants. The whole-organism liquid assay provides a novel approach to probe chemical libraries in a high throughput manner for compounds that reduce bacterial virulence in plants.

References

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