Molecular mechanisms of effector-triggered immunity in plants

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Like other organisms, plants are continuously exposed to potential pathogens. Yet most plants are resistant to most pathogens because of multi-layered defenses. The most potent forms of plant defenses are triggered when the plant perceives pathogen-derived molecules. This innate immune system is a very valuable trait: when harnessed for agriculture, the innate ability of plants to resist pathogens lessens the need for energetically and environmentally costly pesticides. However, these strong inducible defenses also have the potential to adversely affect the plant if not properly kept in check. Plants with constitutively activated defenses display a severe reduction in biomass and viability. Using complementary biochemical, cell biological and genetic approaches, my lab is studying the machinery that positively or negatively controls the activation of pathogen defenses in the reference plant *Arabidopsis thaliana*. A proper balance between plant immune system activation and suppression will maximize biomass production.

Principles worked out with Arabidopsis are very relevant for crop plants. The Arabidopsis genes we are studying are conserved throughout the plant kingdom. Currently we are applying our knowledge of the plant immune system gained with Arabidopsis to grapevine. We study the difference in fungal disease susceptibility between Cabernet sauvignon and Norton, a North American grapevine species and the State Grape of Missouri, and find genes that are well known from Arabidopsis work to respond differently in the two species.