

Amino acid studies may aid battle against citrus greening disease

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Amino acids found in orange juice may provide keys to detecting citrus greening disease and combating this stealthy and costly threat to U.S. citrus groves.

Amino acids in orange juice might reveal secrets to the successful attack strategy of the plant pathogen that causes citrus greening disease, also known as Huanglongbing or HLB. Studies of these amino acids by U.S. Department of Agriculture (USDA) chemist Andrew P. Breksa III and University of California-Davis professor Carolyn M. Slupsky may pave the way to a safe, effective, environmentally friendly approach to undermine *Candidatus Liberibacter asiaticus*, the microbial culprit behind HLB.

For a 2012 study in the [Journal of Proteome Research](#), the scientists

used nuclear [magnetic resonance spectroscopy](#) to study the [amino acid composition](#) of juice from oranges grown on HLB-positive or HLB-negative trees. Their investigation is apparently the first to use this technology for that purpose, according to the researchers.

The study yielded distinctive profiles of the kinds and amounts of 11 different amino acids in three types of oranges: fruit from healthy trees; symptom-free fruit from HLB-positive trees; and fruit, with HLB symptoms, from HLB-positive trees.

With further research, the profiles may prove to be a reliable, rapid and early indicator of the presence of the HLB pathogen in an orchard, according to Breksa. He is with the Agricultural Research Service (ARS) Western Regional Research Center in Albany, Calif. ARS is the USDA's chief intramural scientific research agency, and this research supports the USDA priority of promoting international food security.

Breksa also noted that the profiles may reveal clues to mechanisms underlying the microbe's mostly unknown mode of attack. For instance, if the HLB pathogen were causing havoc with the trees' ability to create, use and recycle amino acids, scientists might be able to use that information as a starting point for a counterattack strategy.

Phenylalanine may be a case in point. An orange tree can convert this amino acid into cinnamic acid, a precursor to compounds thought to be important to the tree's defense system. But the researchers found that juice squeezed from oranges of HLB-positive trees had significantly higher concentrations of phenylalanine, which suggests that the HLB pathogen may have interfered with the tree's conversion of phenylalanine to cinnamic acid.

More information: [Read more](#) about this research in the January 2013 issue of *Agricultural Research* magazine.

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