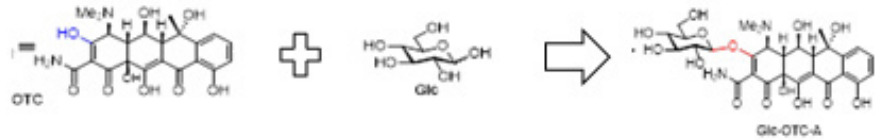


Enhancing the Delivery of Therapeutics into Citrus Phloem by Linking Sugar Molecules

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Summary: Huanglongbing (HLB) is associated with defense responses in the phloem, where the bacterium resides, that inhibits sugar and nutrient transport. Reducing *Candidatus Liberibacter asiaticus* (CLAs) by trunk injection antimicrobials, such as oxytetracycline, increased yields, canopy density and fruit health, and reduced fruit drop. However, we are currently unable to target antimicrobials and other therapies specifically to the phloem. The phloem is a narrow and selective tissue buried inside the stem, resulting in a very small percentage of the active ingredient entering the phloem, while most of the material injected reaches the xylem, where no CLAs is

present. To address this challenge, we propose to take advantage of a recent findings, that adding a glucose molecule to different compounds promotes loading into the phloem and increases their phloem mobility. These discoveries showed that the glucose molecule could be recognized by certain phloem transporters and deliver the glucose-linked fluorescent molecules into the phloem. Building on this finding, we will add a glucose molecule to various antimicrobials. We expect this innovation to dramatically improve the efficacy against CLAs and reduce the effective dose needed for efficient HLB control by increasing loading into the phloem and reducing environmental risk and the cost of treatment. The glucose-

linked therapies that show promising improvements in citrus health can be further commercialized to make them available as products.

Take Home Message:

- The loading of antimicrobials specifically into the phloem is the major barrier to efficient CLAs targeting.
- Recently, it was discovered that adding a glucose (Glc) molecule to different non-phloem-mobile insecticides or fluorescent dyes enables the plant to actively load these compounds into the phloem.
- Building on this finding, in this application we will test whether adding glucose to antimicrobials increases their phloem uploading and efficiency.

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