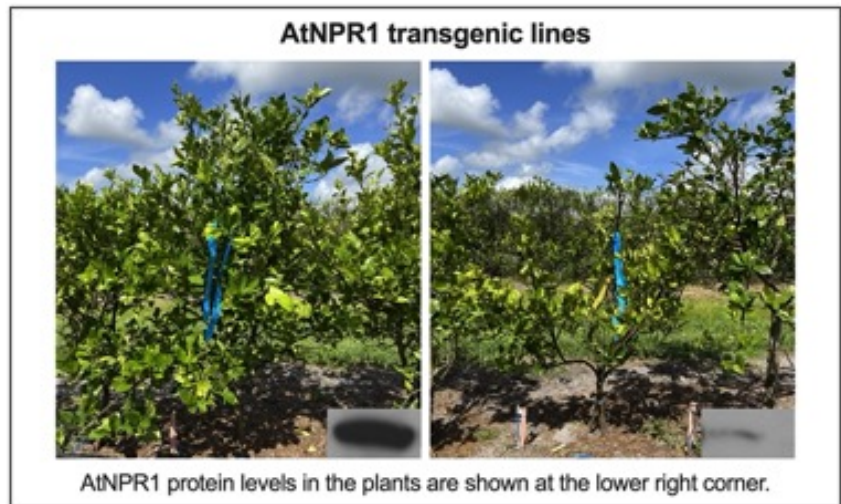


Generation of Transgenic Huanglongbing Tolerant Citrus Varieties

Researchers: Zhonglin Mou,
William Dawson

Contact: Zhonglin Mou,
zhlmou@ufl.edu

UF/IFAS Gainesville



Take Home Message:

- Over-expression of AtNPR1 confers HLB tolerance.
- Transgenic approach is highly effective for creating HLB tolerance.
- Enhancing citrus basal immunity can increase HLB tolerance.

Summary: Huanglongbong (HLB) is a devastating citrus disease caused by the bacterial pathogen *Candidatus Liberibacter asiaticus* (CLAs). There is currently no cure for this disease. In this project, we applied the knowledge of bacterial disease resistance that has been produced in the model plant *Arabidopsis* towards creating HLB resistance or tolerance in citrus. A total of 20 *Arabidopsis* genes

encoding positive immune regulators have been transformed into citrus. The resulting transgenic lines were screened for HLB-resistance or tolerance in the greenhouse using CLAs-infected psyllids. Several genes were found to confer HLB-tolerance in the transgenic plants, among which is the *Arabidopsis* NPR1 (AtNPR1) gene. NPR1 is a key positive regulator of systemic acquired resistance and has been shown to increase disease resistance in multiple crops. Our results revealed a tight correlation between HLB tolerance and AtNPR1 protein levels in transgenic citrus plants. After being infected by CLAs, transgenic plants with high levels of

AtNPR1 protein develop no or mild leaf symptoms and continue growing normally, even though CLAs titers can rise to high levels in the plants. Furthermore, the original lines have been propagated multiple times by grafting and all the progeny plants exhibited the same level of tolerance. These results indicate that the HLB tolerance phenotype of the transgenic lines are stable after grafting propagation, which is essential for the lines to be used in the industry. The progenies of the HLB-tolerant transgenic lines are currently being evaluated in field trials as a potential management solution for HLB.

Funding:

 National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

