8.9 Callose Predominates over Phloem Protein 2 in Phloem Plugging of Trees Affected with Huanglongbing

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Phloem plugging of citrus trees affected with huanglongbing (HLB) was shown previously to result from two types of materials in sieve elements, callose, and a lectin of phloem protein 2 (PP2) (Achor et al., 2009). An associated study (Etxeberria et al., 2009) found that diversion of sugars to starch accumulation left the root system of affected trees lacking carbohydrate reserves as starch. It was proposed that this plugging and sugar diversion might be responsible for the decline of HLB-infected trees. This study evaluated plugging in four cultivars (Flame, Valencia, Hamlin, and Murcott) in field sites, and two cultivars (Duncan and Valencia) in a greenhouse to determine if one plugging type predominated and was a better candidate for transformation or some other type of blocking of its production. Field and greenhouse plants affected by HLB were sampled and leaf tissue prepared for transmission electron microscopy. A total of 22 field and 7 greenhouse trees were sampled to observe leaf phloem plugging types. Callose plugging predominated in all samples with a range of callose to PP2 of 1.8 to 13. The average ratio was 2.7 for all field samples and 2.4 for greenhouse samples. This data suggests that callose plugging is more likely to cause phloem dysfunction, but PP2 plugging accounts for over 25% of the phloem plugs.

References
