5.6 Use of Electronic Sensor Technology to Discriminate between Juices from Huanglongbing Infected and Healthy Orange Trees

Bai, J.¹, Dea, S.¹, Plotto, A.¹, Baldwin, E.¹, Irey, M.S.²

¹USDA-ARS, Winter Haven, FL, USA
²U.S. Sugar Corporation, Clewiston, FL, USA

Orange juice squeezed from huanglongbing (HLB) infected fruit may have altered flavor in comparison with juice from healthy fruit. It would be useful to detect and discriminate these juices from regular juice in a quality control program. Electronic tongue (e-tongue) and electronic nose (e-nose) are devices that mimic human sense of taste and olfaction, respectively, based on sensor arrays and pattern recognition systems. In this study, juices from asymptomatic (HLBa), symptomatic (HLBs), and healthy Valencia and Hamlin fruit were analyzed using AlphaMOS e-nose (FOX) and e-tongue (ASTREE) over two harvests per variety. One Hamlin harvest included fruit from trees grown under the Maury Boyd’s (MB) nutritional and plant defense spray program. A blended juice series with 50, 25, 12.5, and 6.25% HLBs juice balanced with the healthy juice, together with 100% HLBs and healthy juices were analyzed to determine the influence of HLBs on juice quality. Results were compared with sensory evaluation data. Healthy, HLBa, and HLBs juices were separated from each other by both e-nose and e-tongue for all varieties and harvest times. Juices from the MB program were well separated from those without MB application for both HLBa and HLBs; moreover, these juices were closer to healthy juice than non-MB-HLB juice in discrimination distance. There were clear trends in the principle component analysis plots when HLBs + healthy blend juice dilution series were analyzed by e-tongue, but not by e-nose. Discrimination between samples by electronic sensors agreed with sensory data in most cases.