

Liu, Z.; Rappaport, K.; Twieg, E.; Mavrodieva, V.; and Levy, L. 2010. CANARY biosensors for rapid detection of *Ralstonia*, Potyvirus and *Phytophthora*. *Phytopathology* 100:S73.

CANARY (Cellular Analysis and Notification of Antigen Risk and Yield) is a cell-based technology that is capable of rapidly identifying low levels of pathogens through detection of photons emitted by bioluminescent proteins upon crosslinking of antigens to engineered antibodies expressed and anchored on the outer membrane of the cell. The method was invented by scientists at the Massachusetts Institute of Technology and has been applied for medical diagnostic assays and monitoring of select agents. MIT and USDA APHIS developed plant-pathogen-specific-cell lines for detection of *Ralstonia solanacearum*, and to the genus-level for Potyvirus and *Phytophthora*. The eventual goal is to implement the CANARY system in plant diagnostic labs. For *Ralstonia* detection, we sliced a small piece of infected plant tissue and soaked it in assay buffer for a few minutes before CANARY testing. As few as 3 CFUs of *Ralstonia* can be detected in a single test. For Potyvirus detection, we used polystyrene beads to capture viruses from plant extract for CANARY. For both the Potyvirus and *Ralstonia* assays, only 10 minutes or less are required for sample preparation and sample testing. For *Phytophthora* detection, a second antibody, which is different from cell membrane antibodies, was used to coat magnetic beads that were applied to capture mycelia in plant extract in preparation for CANARY. The protocols and data will be discussed to demonstrate the speed and sensitivity of this technology.