

Special project

Evolution of citrus greening pathogen (HLB) strains in ASPAC (Year 1)

IN RECENT DECADES, citrus greening disease (HLB) has been devastating citrus orchards in the Asian and Pacific region, and causing serious losses to the citrus industry in these areas. Basic information on the evolution of HLB strains in terms of pathogenicity and disease resistance is primarily important in formulating adequate measures for controlling the HLB disease. This two-year FFTC/NIFTS international collaboration project shall focus on the investigation of pathological and epidemiological natures of HLB pathogen strains in Taiwan and in the ASPAC region. Topics/issues to be addressed include:

- a. Pathogenicity identification of citrus greening (HLB) pathogen strains collected from Taiwan and the southeast Asian countries.
- b. Distribution of jasmine orange (*Murraya paniculata*), and their susceptibility test to HLB pathogen
- c. Disease resistance of important citrus cultivars against HLB virulent common strains

Accomplishments for Year 1

A major survey project initiated in the 1980s revealed that many serious virus diseases have a much wider distribution in the Asian and Pacific region than had been previously believed. Of these, citrus HLB is one of the most destructive. Citrus HLB or greening disease is a serious disease in tropical and subtropical regions like southeast and east Asia. Some reports have indicated that the disease has gradually spread to temperate regions presumably caused by global warming. As an initial activity under this project, a survey team visited several citrus-growing areas in Vietnam to gather benchmark information on developing integrated pest management (IPM) dealing with the citrus HLB problem. increased income.

Identification of HLB strains in Taiwan. The identification of HLB strain/form has been differentiated on the criteria of pathological characterization including disease index of pathogenicity and PCR index of pathogen infection and multiplication in citrus plant. According to pathological bioassay of HLB isolates with differential citrus cultivars so far made, the Taiwan HLB isolates were differentiated into three strains: 1) strain I causing severe greening symptoms on Ponkan (Pon) and Liucheng (LC), and no infection or mild infection without symptom on Wentan; and 2) strain II showing high pathogenicity on Pon., LC, and Wentan; and strain III infecting Pon and LC without symptom and no infection on Wentan.

Diseased samples, 140 from Hsinchu and 68 from Miaoli districts, were collected from major citrus-greening areas for subjecting to indexing of HLB, CTV (Citrus tristeza Closterovirus), and CTLV (Citrus tatter leaf Capillovirus); while 25 samples were selected to be the representative HLB isolates for strain identification by pathogenicity assay.

Identification of HLB strains from Vietnam. About 14 samples were collected from citrus trees of major cultivars grown in five locations near SOFRI, Southern Vietnam. All diseased samples with greening symptoms showed positive PCR detection, while negative PCR detection was demonstrated by healthy samples.

Results. The 25 HLB isolates selected from 208 diseased samples from the major citrus-greening areas in Taiwan, are assumed to be enough representative of Taiwan HLB strains. So far both strains I and II were detected, while strain II dominated over strain I.

Strain III has not been detected yet presumably due to the very low population and transmissibility of the mild III strain. Strain II isolate can be further differentiated into two forms (II-1 and II-2) according to the different virulence on Wentan pummelo seedling. The conclusive strain identification of Taiwan HLB isolate will be obtained 12 months after inoculation assay.

Only strain II, including forms II-1 and II-2, was found among 14 samples from five localities in Southern Vietnam. It seems that the evolved strain II affecting mandarin and pummelo already dominated Vietnam, the same as in Taiwan. Strain I infecting only mandarin and sweet orange, was not detected in any of the areas.

Workplan for the second year (April 2006 to March 2007)

1. Further pathogenicity identification of HLB strains collected from Taiwan and southeast Asian countries by using additional differential cultivars.
2. Resistance/susceptible test of important citrus cultivars against virulent common strains of

HLB, based on symptom expression and pathogen detection by PCR index.

3. Susceptibility test of the jasmine biotypes collected from Taiwan and some other countries, against a virulent common strain of HLB by means of psyllid transmission and bud-graft inoculation.
4. Extraction of total nucleic acid from the selected isolates of HLB strain/forms for delivery to NIFTS, Japan for molecular characterization.

FFTC/NIFTS International Collaborative Project on "Evolution of citrus greening pathogen (HLB) strains in ASPAC" (Y1)

This two-year (April 2005 - March 2007) special project will be carried out in Taiwan ROC, Japan, Vietnam, and other southeast Asian countries.

Co-sponsor:

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