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Huanglongbing (HLB) As Citrus Devastating Disease: A Technical Report

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Introduction

Citrus is one of the most important fruit crop growing in hundreds of countries at commercial level in the world. Pakistan is one of the largest citrus producing countries and it is ranked at 13th in the production of citrus fruit and occupies a pride position in the economy of the country. Citrus is affected by many of bacterial, fungal and viral diseases which which causes the severe loss to the citrus industry. Citrus greening is one of the most devastating disease. Citrus greening is also called Huanglongbing (HLB) on the bases of peculiar yellow shoot symptom of the disease. Huanglongbing was first report in China in late 19 century.

Causative Organism

Candidatus liberibacter

1. Asian form; *Candidatus liberibacter* asiaticus
2. African form; *Candidatus liberibacter* africanus
3. American form; *Candidatus liberibacter* americanus

Common names

Citrus greening, Yellow shoot, Yellow dragon

Symptoms

Leaf: Blotchy mottling is the most characteristic symptom of Huanglongbing. This mottling symptoms are distinct from Zn deficiency. These blotchy mottle are usually visible on both sides of the leaf. Dark green areas are reduced to small circular dark green dots that contrast with yellow or light green background. Other then these blotchy mottle, infected leaves also become thicker and leathery. They also have raised corky veins.

Fruit: The fruit remains small and becomes lopsided. When fruit is cut, it has a curved axis. Seed abortion occurs in infected fruits. Fruit is ripen backwards but the stylar end remains green as the fruit original colors. The symptomatic fruit results with reduced fruit size, premature fruit drop, low soluble acids content in the juice and a bitter taste of the juice.

Whole Plant: The irregular presence of symptoms on the tree means the irregular distribution of the pathogen in the plant. The severely infected plant have very thin top third of the canopy. As a result, the tree can go into a complete decline, collapse and may die. The infected trees with a prolonged infection become stunted (Figures 1-3).

***Figure 1**: Color inversion symptoms on fruit and Lopsided fruit symptoms.*

***Figure 2:** Lopsided fruit with seed abortion symptoms And One-third part of tree showing the yellowing symptoms of HLB.*

Figure 3: *Asymmetrical mottling pattern on leaves and Corky veins symptoms on leaves.*

Pictorial Description of Symptoms

Host range

Citrus Greening can infect all cultivars and hybrids of citrus. The Genera of Rutaceae family that can be infected by this disease are Balsamocitrus, Clausena (Wampi), Microcitrus, Murraya (orange-jessamine), Severinia (Chinese box-orange), Toddalia, Atalantia, Calodendrum, Fortunella (Kumquat), Poncirus (trifoliate-orange), Swinglea and Triphasia (trifoliate limeberry).

Disease cycle

Citrus greening is caused by a phloem limited bacteria. In citrus, there are three strains of concerned Bacteria i.e. Asian, African and American forms. The Asian form of bacterial infection shows the symptoms in both warm and cool conditions. The African form of bacterial infection shows symptoms in cool conditions with temperature of 20-250 °C. The American form of bacterial infection is heat sensitive and does not grow above night / day temperature of 24/32 °C.

Distribution

- *Candidatus liberibacter* asiaticus is present in Asia, South America, Middle East, Central America and Southeast United States.
- *Candidatus liberibacter* africanus is present in Africa and Middle East.
- *Candidatus liberibacter* americanus is found only in Brazil.

Integrated Disease Management

Citrus crop is cultivated almost in all over the world and almost all the citrus orchards are adversely affected by citrus greening. Depending upon the threat level of pathogen and insect vector epidemiology, different management strategies can be used.

1. Quarantine measures can be implemented to keep the disease away from non infected places.
2. It is essential to control the population of insect in order to stop the disease spread.
3. Thermal therapy treatment by continuous heat exposure to 40°C to 42°C for a minimum of 48 hours can be used to suppress or eliminate disease from plants
4. Antibiotics like ampicillin, carbenicillin, cephalexin etc. are highly effective to suppress *Candidatus liberibacter* asiaticus population in infected trees
5. Foliar applications of micronutrients can be used to lessen effects of induced mineral deficiencies
6. Resistance varities should be used.

Additional Reading

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