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Bacterial wilt of Solanaceous Crops: Identification and Management

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SUMMARY

In India, solanaceaous crops are widely cultivated in all parts of country. In past years, the incidence of bacterial wilt disease reduces solanaceous crops production considerably. Bacterial wilt is very destructive disease in solanaceous crops which caused by *Ralstonia solanacearum*. The incidence of bacterial wilt occured wherever solanaceous crops are grown. The disease management strategy for effective management is challenging because no single control measures are effective against disease. Integrated disease management practices with use of bacterial antagonist agents to control and manage disease is very effective method to control or minimize disease.

INTRODUCTION

Bacterial wilt in solanaceaous crops which is caused by a bacterium *Ralstonia solanacearum* (Smith, 1896) formerly known as *Pseudomonas solanacearum*. Bacterial wilt is major devastating disease occurring in solanaceaous crops viz., Potato, Tomato, Brinjal, Chilli etc. It is one of the most important plant disease has extensively been distributed in tropical, subtropical and some warm temperate regions of the world (Hayward et al., 1991). It has a large host range with more than 200 species of many economically important crops (Aliye et al. 2008). The disease is also known as southern bacterial blight, brown rot and various other names in countries where it occurs. Bacterial wilt is said to be causing 10 to 90% crop losses around the world.

Ralstonia solanacearum

Ralstonia solanacearum is rod shaped, gram negative, aerobic, non-spore forming, motile with polar flagellum (lophotrichous), size ranges from 0.5 - 0.7 x 1.5 - 2.0 µm, β proteobacterium. It survives for longer period in soil, water, latently infected plants and can be spread by soil, irrigation water, contaminated farm equipments and infected plant materials (Hayward, 1991). R. solanacearum is classified as most important plant pathogenic bacterium because of its lethality, persistence, wide biological variation, broad host range and geographic distribution. The bacterium colonizes xylem vessels by they dissolves cell walls and produce highly polymerized polysaccharides, which increases thickness of the xylem which resulting in plugging and causes plant wilting (Vasse *et al*., 1995).

Symptoms, Signs and Identification

The typical symptoms of bacterial wilt observed in solanaceous crops as, initially the younger leaves lose their turgidity from top of the branches and become flaccid, lower leaves turn pale yellow, followed by drooping and drying of leaves and eventually death of plants. The wilting of youngest leaves observed during hottest part of the day with half leaflet may wilt and plant recover at night when temperature are cool. In infected plant stem, vascular bundles appeared as long, narrow and dark brown streaks. In potato, grey brown discoloration of vascular tissues observed on tubers at later stage of disease development. The disease symptoms favoured at high temperature (29-350C). The surface of freshly cut section of infected plant stems exudates milky or sticky substances of bacterial mass is another sign of bacterial wilt (Champoiseau, 2008).

Stem-Streaming Test/ Bacterial Ooze Test

The cut section of infected stem placed in glass of clear water. After few minutes; viscous white spontaneous mass of bacterial cells comes out from cut end of the infected stem like smokes or milky white appearance, which is indication of presence of bacterium in infected stem tissue. Stem-streaming test is very valuable tool for tentative detection of bacterial wilt in field and laboratory.

Disease Development

R. solanacearum survives longer period in soil and water and transmitted through contaminated soil, irrigation water, contaminated farming tools or equipments. The bacterium usually infects plants by getting entry

through wounds (natural wounds or injury made by agronomical practices). After invading, the bacterium colonizes xylem vessels and dissolves cell walls and produce highly polymerized polysaccharides, which increases thickness of the xylem vessels which resulting in plugging or blockage.

Management Strategies

The single management strategies is ineffective to manage disease hence, integrated disease management practices should be applied to control disease.

- Select clean field for cultivation where previously no incidence of bacterial wilt disease.
- Use disease resistant varieties for cultivation.
- Crop rotation with non host crop (previous crop grown as paddy or green manures or other non host crops).
- Soil fumigation. (eg. Methyl bromide)
- Remove and destroy infected plant debris from field and avoid mechanical injuries during intercultural operations.
- Use biocontrol agents for disease management (eg. Native strains of Pseudomonas fluorescence).
- Use of Bactericide. eg. Streptocycline- 0.3g/ ltr. of water or bleaching powder 0.3 % solution drenching after 20-30 days after transplanting of crop.

CONCLUSION

The bacterial wilt is very damaging disease of solanaceous and many other commercially important crop plants which reduces crop production considerably. Chemical management is ineffective to control disease and cause environment pollution and increase cost of cultivation. The integrated disease management practices are helpful to minimize disease. The use of bacterial antagonist to manage disease is very effective strategy for bacterial wilt disease management.

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