

## Leaf Curl Disease of Tomato: Identification, Transmission and Management

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### SUMMARY

Tomato (*Solanum lycopersicum*) is an important and most widely grown among the vegetable crop of the world and India. Among the diseases, leaf curl disease is considered to be one of the important disease of tomato; as it taking heavy losses of tomato yield (Sastry and Singh, 1973; Muniyappa et al., 2000). The disease management strategies for effective management is challenging because no single control measure are effective against it. Integrated disease management practices with use of chemical and plant extract agents to control and management of transmitting agent and minimize the disease.

### INTRODUCTION

Leaf curls disease of tomato caused by *Gemini virus* (Genus *Begomovirus*, family *Geminiviridae*) and transmitted persistently by vector whitefly (*Bemisia tabaci*). The disease assumed a serious proportion after introduction of tomato hybrid in country. Presently the disease is occurring in severe proportion in all tomato growing state of India. Tomato leaf curl disease is more serious in summer in South India & in kharif North India, but high proportion of disease has been observed on other season also because continuous and overlapping cultivation of tomato (Naik, 2001). Tomato leaf curl disease said is causing up to 80 % crop losses around the world (Ansari, 2005).

### Tomato Leaf Curl Virus (ToLCV)

*Begomovirus* are large group of whitefly transmitted virus containing single stranded closed circular DNA (ssDNA) with bipartite genome i.e. genome is segmented in to two segment referred to as DNA A and DNA B that are packed in to separate particles and encapsulated in germinate particles. Virus particles are non-enveloped. The nucleocapsid is 38 nanometers (nm) long and 15 – 22 nm in diameter. While particles have basic icosahedral symmetry, they consist of two icosahedra. There are 22 capsomeres per nucleocapsid.

### Transmission

Most plant virus requires a biological vector to spread from plant in nature. Among the biological vectors for plant viruses, hemipteroid insect is the most including phloem feeding whitefly (*Bemisia tabaci*) in a persistent manner. The virus is neither seed or nor sap transmissible but external contamination of seed may occur. For the successful transmission of the virus by vector, minimum acquisition and inoculation feeding periods are 15 minutes and latent period at least 21 hrs. The female adults are more efficient in transmission (92-100 %) than male (23-28 %) (Ramappa, 1993). Presences of weed host, perennials etc. serve as the main source of primary inoculum for the virus and vector.

### Symptoms

The symptoms of leaf curl disease are very complex and the typical symptoms includes leaf curling, puckering of leave, vein yellowing, stunting, excessive branching from pale yellowing to deep yellowing and smalling of leaves. Apart from this, it is also causes the extreme distortion of leaves, stunting of plants and premature drop of flower and fruit. Some genotype causes green vein banding, twisting and green enation on the under surface of leaf, upward rolling of margin and island of golden colors scattered amidst the normal green tissue. At cellular level, structure changes have been observed like hypertrophy of nucleus and accumulation of dark granules and aggregate of virus like particles in the cytoplasm.

### Management

Management of virus is difficult as it's systemic in nature, highly variable or diverse insect vector and so on.

- Crop rotation can be utilized for management of disease spread by naturally breaking the life cycle of insect vectors, disease and weeds. Rotation to non-host crops prevents the build-up of large population of the insect vector and also establishes host free period.
- Avoid sowing of tomato close to already infected field, synchronized planting should be followed to avoid initial inoculum from tomato plants
- Nurseries should produce seedling for commercial distribution in insect proof environment or under net cover to minimize infestation by the vector and subsequent virus transmission prior to transplanting.
- Rouging of infected individual's plants may assist in delaying virus spread once the infected material is immediately destroyed and not left to compost near adjacent, developing fields.
- Reflective plastics mulches, yellow plastics mulch and whitefly proof screens can be employed to reduce the incidences of disease infected plants.
- Use resistant varieties like Sankranthi, Nandi and Vaibhav etc.
- Foliar spray of neem (*Azadirachtin*), extract of *Annona squamosa*, *Carlowrightia myriantha*, *Trichillia arborea*, *Azadirachta indica*.
- Neem oil, garlic, sorghum leaf extract and marigold leaf extract give significant result against this disease.
- In chemical spray Imidacloprid, Acetamiprid, Nitenpyram, Thiamethoxam and Diafenthiuron give significant result against white fly.

## CONCLUSION

Tomato leaf curl disease is one of the devastating diseases associate with begomovirus, thus making breeding resistances more challenging. Climate change and use of pesticides ensure the persistence of whitefly throughout the year and further challenges for the management of disease. Chemical management is not much more effective to control disease and it also causes environmental pollution and increase cost of cultivation. The integrated disease management practices are helpful to minimize disease.

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