

Bioelicitors for induction of resistance in tomato plants to treat viral diseases

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EDITORIAL

The major limiting factor in many commercial crop production systems are viral diseases. Changing weather conditions may also lead to successful multiplication of newly introduced viruses in areas that were before unfavorable. Due to non-availability of antiviral products, control strategies rely on clean procedures to avoid viral diseases, or on abolition of diseased plants to control such diseases. Although there were many viruses which already infect tomato, new viral diseases are also rising. In recent years, Pepino mosaic virus (PMV) is an important upcoming viral disease, spoiling the production of tomato worldwide. The genus *Begomovirus* belongs to the taxonomic family Geminiviridae. In tropical and subtropical region of the world, it has caused serious damages for vegetable and fiber crops in productivity. It is the most upsetting and is a major warning factor for the commercial cultivation of tomato. Among the viral diseases, tomato leaf curl disease; tomato leaf curl Bangalore virus (ToLCBV), tomato leaf curl New Delhi virus (ToLCNDV), tomato leaf curl Karnataka virus (ToLCKV) and tomato leaf curl Gujarat virus (ToLCGV) are the important begomo viruses which limit the tomato production. Researchers have found that a variant of the Tomato leaf curl New Delhi virus (ToLCVND) is now causing yellow mosaic disease in a new commercially important brinjal plant and ToLCNDV affecting chilli crops also reported in India. The plant activator,

CGA-245704 (benzo[1,2,3] thiadazole-7-carbothioc acid S- methyl ester) with trade name Bion/Actiguard induces SAR in plants to manage Tomato spotted wilt virus. To reduce the use of pesticides and to improve the effectiveness of viral disease control, utilizing of beneficial microbes isolated from plant rhizosphere referred as Plant Growth Promoting Rhizobacteria (PGPR) might offer a most promising control method for viral diseases. Some of these rhizobacteria are beneficial to the crops either directly or indirectly, leading to encouragement of plant growth. PGPR have various ability to induce systemic resistance in plant which provides protection against a broad spectrum of plant pathogens and is referred as induce systemic resistance (ISR). Some PGPR such as *Pseudomonas fluorescens* strain CHAO is effective to control Tobacco necrosis virus (TNV) on tobacco, *Pseudomonas aeruginosa* strain 7NSK act against Tobacco Mosaic Virus (TMV) on tobacco, *Bacillus subtilis* IN937b and *Bacillus pumilus* strain SE34 act against Tomato Mottle Virus (ToMoV) and Cucumber Mosaic Virus (CMV) on tomato. Reports have shown the usage of fine particles and fluid formulations of two plant growth promoting microbial consortia (PGPMCs) were used to control Sunflower necrosis virus disease. PGPMC-1 consists of *Bacillus* sp. strain MML2551 + *Bacillus licheniformis* strain MML2501 + *Streptomyces fradiae* strain MML1042+ *Pseudomonas aeruginosa* strain MML2212. PGPMC-2 consists of *Bacillus* sp. MML2551 + *B. licheniformis* MML2501 + *P. aeruginosa* MML221.

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