Crown gall disease of important agricultural plants biocontrol methods and their application

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The phytopathogenic bacterium *Agrobacterium tumefaciens* induces crown galls in economically important plants, including grapevine. The above mentioned emphasizes the need for alternative biocontrol technology for Grown Gall disease. Bacteriophages can be considered alternative way to disease control. Agrobacterium species-specific bacteriophages were isolated from different environmental source environmental sources. Transmission electron microscopy (TEM) was used to study the nucleocapsid ultrastructure of bacteriophages.

Phages AP1 and AP12m, also AP7 and AP9 were tested under greenhouse conditions for the ability to protect tomato plants against crown gall tumors induced by pathogenic agrobacteria. Soaking of roots of tomato seedlings with water suspension of phage AP1 was shown efficient for prevention of crown gall on plants infected by strain *At* Sh-1, while similar treatment of roots with phages AP7 or AP12 significantly suppressed development of crown gall induced by strains *At* C58, *Av* S4 and *Av* Tm4. Best result for treatment was shown with pathogen inoculation 1 and 2 weeks later after 3 -12 hrs roots soaking with phage suspension.

Agrobacterium specific phages can be effectively used as biocontrol agents against crown gall disease. Application of *Agrobacterium* phages is specific towards pathogenic *Agrobacterium* and apparently not risky for beneficial rhizobial microflora.

Another aprouch for biological disease control is treatment with ACCD strains. The ACCD-producing strains Pseudomonas putida UW4, Burkholderia phytofirmans PsJN and Azospirillum brasilense Cd1843 /pRKTACC, carrying the acdS gene from UW4 under the tetracycline resistance (tet) promoter, were tested for the ability to protect tomato plants (cv.M82D) against pathogenic *Agrobacterium* strains. The formation of tumors was strongly inhibited when the roots of 4-week-old tomato seedlings grown in the nursery were soaked in a suspension of an ACCD-containing bacterium and then transferred into the greenhouse and infected 4–5 days later by injection into a wound on the stem with a pathogenic *Agrobacterium* strain.

The use of ACCD-containing bacteria may be viewed as a general antipathogenic agent for biologically friendly treatment of disease.