Deutscher Tropentag, October 11-13, 2005, Hohenheim

"The Global Food & Product Chain—
Dynamics, Innovations, Conflicts, Strategies"

Soil Amendment with Silicon and Bacterial Antagonists Induce Resistance Against Bacterial Wilt Caused by *Ralstonia solanacearum* in Tomato

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Abstract

In tomato plants grown in hydroponic culture, the incidence of bacterial wilt caused by *R. solanacearum* race 1 was significantly reduced by silicon amendment in tomato genotypes L390 (susceptible) by 26.8 % and King Kong2 (moderately resistant) by 56.1 % compared to non-treated plants. However, wilt incidence in silicon-treated plants of genotype L390 reached 100 % at 13 dpi, while in genotype King Kong2, plant death was retarded by 6 days, with 20 % reduction of final wilt incidence. Bacterial numbers were significantly lower in silicon-treated compared to non-treated plants in King Kong2 at 2 dpi in midstems and in all organs at 5 dpi, and in Hawaii 7998 (resistant) in all organs at 2dpi. Differences between genotypes were obvious on midstem level, where bacterial populations were generally significantly lower compared to roots. Increased tolerance was observed in genotypes L390 and King Kong2 with silicon treatment. Trials in substrate-grown plants confirm the symptom-suppressing effect of silicon. Silicon accumulated in roots and was low in stems and leaves. Inoculation with *R. solanacearum* did not significantly affect silicon uptake and distribution. Negative correlations between root silicon content and bacterial numbers of midstems in genotypes Hawaii 7998 and King Kong2 suggested an induced resistance.

Treatment of tomato with bacterial antagonists reduced disease incidence by up to 68 %. Immunohistochemical studies show changes in cell wall composition in pathogen-inoculated, silicon-amended and also antagonist-treated plants compared to control plants. Indications for an influence of host genotype and silicon treatment on the phenotypic conversion of *R. solanacearum* from fluidal to non-fluidal colonies in planta were observed.

Keywords: Bacterial wilt, IPM, tomatoes

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