

Effect of Temperature on the Inhibition of *Ralstonia* spp. on Maize Seedling (Poster)

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Introduction

Soil temperature extremes stress effects the competitive ability of microbial growth and are important in the mechanism of weakening of microorganisms in heat treated soil. Freeman and Katan (1988) reported that sublethal heating of conidia and chlamydospores of *Fusarium oxysporum* caused reduction in populations and loss of viability.

Objectives

To test the efficacy of short exposures to high temperatures and a range of time periods in reducing the viability of *Ralstonia* in soils and the effect on maize sowing under laboratory conditions.

Methods

One milliliter containing 1×10^9 cfu of *R. solanacearum* strains were mixed thoroughly with each gram of soil. Four sets of flasks were used in this experiment. The first set where the sterile distilled water was mixed with sterile soil. The second and third sets where the soil were mixed with bacterial suspension of *R. solanacearum* strain and incubated at 45 °C and 60 °C, respectively, before sowing. The fourth set where the soil was mixed with bacterial suspension of *R. solanacearum* before sowing. Two weeks after sowing, seedlings of each sets were determined the weight and germination.

Results

Mixing the bacterial suspension of *R. solanacearum* strains with the soil and incubated at 45 °C or 60 °C for 2 d and 2 h, respectively, inhibited the infection on maize germination by 100%. Highly significant reduction in fresh and dry weight was obtained when 2 weeks old maize seedlings which the seeds were sown and grew in the soil mixed with *R. solanacearum*, treatment Control + *R. solanacearum*, relative to control seedlings, treatment Control. On the other hand, pretreatment of soil with incubation at 45 °C for 2 d or 60 °C for 2 h reduced the deleterious effect of *R. solanacearum* on maize seedlings. In the untreated control soil, the total bacterial population was $2.4-7 \times 10^8$ cfu/g. The populations of *R. solanacearum* were strongly reduced in the treated soil by incubation at 45 °C and 60 °C for 0-48 h and 0-120 min, respectively.

Conclusion

A constant temperature of 45 °C for 2 day or a minimum temperature of 60°C for 2 h was applied in soil, after which maize seedlings were grown. The incidence of maize drop was very low in the heated plots, but a 55-85 % loss of maize to the disease was observed in the control plots (no heat treatment). The populations of native *Ralstonia* spp. were reduced from $2.4-7 \times 10^8$ colony forming units (cfu) g⁻¹ to 0-115 cfu g⁻¹. This study presents the report on the efficiency of high temperature treatment on soil against maize bacterial wilt pathogens.

Keywords: maize, germination, bacterial wilt

Selected References

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