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Allelopathic Effect of Intercropping with Marigold and Common Rosemary on Tomato Early Blight Disease Development

ALIREZA KOOCHEKI, LEILA ALIMORADI, GOLSOOMEH AZIZI

Ferdowsi University of Mashhad, Dept. of Agronomy, Iran

Abstract

In order to evaluate the allelopathic effects of intercropping with marigold and common rosemary on tomato early blight disease development Intercropped systems promote biological diversity, improve the use of natural resources, diminish the risk of crop losses and can provide barriers to the spread of plant diseases. Medicinal plants can grow in intercropping. Common Rosemary (*Rosmarinus officinalis*) and Marigold (*Tagetes erecta* L.) are multipurpose crops with remedial, ornamental, medical and pharmaceutical uses, and reported antimicrobial properties. Tomato early blight, caused by *Alternaria solani*, is perhaps the most common leaf disease in this crop and is considered one of the main diseases affecting tomato production in Iran. In this experiment, we evaluated the effects of marigold intercropped with tomato (*Lycopersicon esculentum* Mill.) and Common Rosemary (*Rosmarinus officinalis*) on *A. solani* on tomato leaf damage in farm condition. Results showed that intercropping with marigold and common rosemary induced a significant ($p < 0.05$) reduction in tomato early blight caused by *A. solani*, by means of two different mechanisms. The first mechanism was the allelopathic effects of marigold and common rosemary on *A. solani* conidia germination. The second way was by altering the microclimatic conditions around the canopy, particularly by reducing the number of hours per day with relative humidity $\geq 92\%$, thus diminishing conidial development. The third mechanism was to provide a physical barrier against conidia spreading. When intercropped with tomato, Common Rosemary plants worked also as a physical barrier and promoted reductions in the maximum relative humidity surrounding the canopy, but to a lesser extent than marigold.

Keywords: *Alternaria solani*, common rosemary, *Rosmarinus officinalis*, early blight, intercropping, microclimate, Marigold, *Tagetes erecta*, tomato, *Lycopersicon esculentum*