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Efficacy of *Warburgia ugandensis* Extract and *Trichoderma asperellum* as Fungicide Alternatives in Control of Early and Late Blight of Tomatoes (*Solanum lycopersicum*)

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Abstract

Early blight caused by *A. solani* and late blight caused by *P. infestans* are among the most destructive diseases in tomato production and are controlled using fungicides. The objective of this study was to evaluate effectiveness of *Warburgia ugandensis* stem bark (SB) lyophilized crude extract and *T. asperellum* alone or in combined treatments as alternative control to fungicides for early and late blight of tomatoes. *W. ugandensis* is an indigenous medicinal tree of East Africa. Trichoderma species are free-living fungi in most soils that induce plant pathogen resistance. *In vitro* inhibition tests of the pathogens using potato dextrose medium and different concentrations of the extract were carried out using hole-plate diffusion technique. Dual culture technique was used for *T. asperellum*. Minimum inhibitory concentration (MIC) was determined. Weekly foliar application of the effective single or combined concentrations of W. ugandensis and *T. asperellum* were administered invivo. The positive control was treatment with Mancozeb. Three replicates were carried out invitro. The disease severity (DS) and the percentage severity index (PSI) were calculated. The height of the plants were measured and recorded. The data was subjected to analysis of variance (ANOVA) using Statistical Analysis System (SAS) and the differences among treatment means separated using Tukey's test ($p < 0.05$). Invitro, the MIC for *W. ugandensis* extract was 0.00125 g/ml for *A. solani* and 0.0025 g/ml for *P. infestans*. The extract concentration of 0.005 g/ml inhibited linear growth of A. solani by 25.67 ±0.33 and 15.00 ± 0.58. Dual culture inhibition on day 8 for *A. solani* by *T. asperellum* was 100 % and 65.49 % for *P. infestans*. Weekly alternative spraying with *W. ugandensis* and *T. asperellum* resulted in DS of 38.1 % for *A. solani* and plant height was 23.7 cm while in *P. infestans* DS was 42.2 % and plant height was 22.8 cm. The positive control resulted in DS of 31.2 % for *A. solani* and plant height of 24.9 cm while in *P. infestans* DS was 34.8 % and plant height was 24.0 cm. The results suggest that the combined use of *W. ugandensis* extract and *T. asperellum* is effective in control of blight in tomatoes. They are environment-friendly and a better alternative for organic farming.

Keywords: *Alternaria solani*, fungicide alternatives, inhibition, *Phytophthora infestans*, tomatoes, *Trichoderma asperellum*, *Warburgia ugandensis*

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