Quantification of Macrophomina phaseolina Survival After Organic Soil Treatments Under Multiple Temperature Regimes

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`Macrophomina phaseolina (M. phaseolina) is a soil-borne fungus that impacts many crops and can cause diseases, such as charcoal rot. Therefore, it is necessary to find a successful way to regulate the growth of this fungus to replenish crop yields and stop economic losses. The impact of temperature and anaerobic soil disinfestation (ASD) with the organic amendments of molasses and chicken litter was studied. Wheat berries inoculated with M. phaseolina were grown in soil with control or ASD treatment in growth chambers at 25°C, 30°C, and 35°C for 3 weeks, and afterwards, DNA was extracted for qPCR analysis. The data was analyzed using analysis of variance (ANOVA) via SAS 9.4. Statistical analysis with a p-value of 0.05 showed a significant difference in the log DNA concentration of M. phaseolina among the different temperatures ($p<0.0001$), and the treatment had a significant difference in the log DNA concentration ($p=0.0081$). The results indicated that at 25°C, there was a significantly higher log DNA concentration compared to 30°C and 35°C, and the ASD treatment had a significantly higher log DNA concentration compared to the controls. The organic amendment of chicken litter may have contributed nitrogen to help the growth of the fungus. Higher growing temperatures from 30°C to 35°C and ASD treatments with different organic amendments can be used in agricultural work in order to increase crop yields, benefitting the agricultural economy and environment as an eco-friendlier alternative to diseases caused by M. phaseolina.

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