Disease-Suppressive Vermicompost Induces a Shift in Germination Mode of *Pythium aphanidermatum* Zoosporangia

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Abstract

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Compost amendments to soils can minimize losses from soilborne plant pathogens, yet the mechanisms by which this occurs have not been well elucidated. In the present study, developmental responses of *Pythium aphanidermatum* zoosporangia to vermicomposts were observed to better understand how suppression of Pythium seedling disease is expressed. Mature zoosporangia were exposed to vermicompost extracts (VCEs) and monitored using time-lapse photomicroscopy. Sterile and nonsterile VCEs inhibited indirect germination and viable zoospore production whereas zoosporangia germinated directly in VCE to produce germ tubes. Additional treatments were tested to determine factors that promote direct over indirect germination. The pH (5 to 9 at 0.001 M) and ionic strength (0.1 to 0.0001 at pH 6) of potassium phosphate buffer did not alter zoosporogenesis compared with sterile water. Decreasing osmotic potentials in glucose and sucrose from –248 to –2,712 kPa or in polyethylene glycol 8000 from –0.335 to –105 kPa led to a decrease in indirect germination with a corresponding increase in direct germination. Significant levels of seed infection were observed within 1 h of exposure to zoospores (produced in sterile water) or to germ tubes (produced in sucrose solution). Our data demonstrate that VCEs suppress zoosporogenesis and stimulate direct germination; however, this did not result in the suppression of germ tube growth and seed infection.