

Fungi and Function in Cropping Soils

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Our project is examining the relationship between biodiversity and functional diversity of soil microbes and disease of cotton seedlings. Theoretically, we are seeking to tease apart two conflicting hypotheses: that of suppression of seedling disease (ecosystem function) by taxonomic diversity or functional diversity. In other words do we need to sustain a soil with lots of microbes, or do we need to sustain lots of microbial functions?

We have been examining the question using a single pathogen, the fungus *Thielaviopsis basicola*, (causes black root rot) and members of the Trichocomaceae (*Penicillium* and *Aspergillus*). The data we present is a preliminary test of the hypotheses.

From two experiments we now can say that increasing diversity is variably associated with suppression of black root rot of cotton. The suppression of disease is not increased by addition of unknown microbes found in natural soils, or compost.

Our next experiment will test the importance of functional diversity. To this end we are characterising our 80 isolates of Trichocomaceae for solubilisation of recalcitrant P (mineral nutrition), digestion of cellulose (organic nutrition), expression of inhibitors (direct suppression), induction of plant resistance (indirect suppression) and growth promotion (presumably hormonal). Once we have functional information, we will compare suppression of disease using isolates selected for the beneficial effects, with randomly selected isolates.