

How does vermicomposted dairy manure protect plants from disease?

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Introduction:

Vermicomposting or earthworm composting transforms manure into an amendment for crop production that can prevent diseases caused by seed infecting pathogens like *Pythium*. Our goal is to understand how vermicomposts protect plants from diseases. We are attempting to answer this question by studying how the development of the pathogen is disrupted.

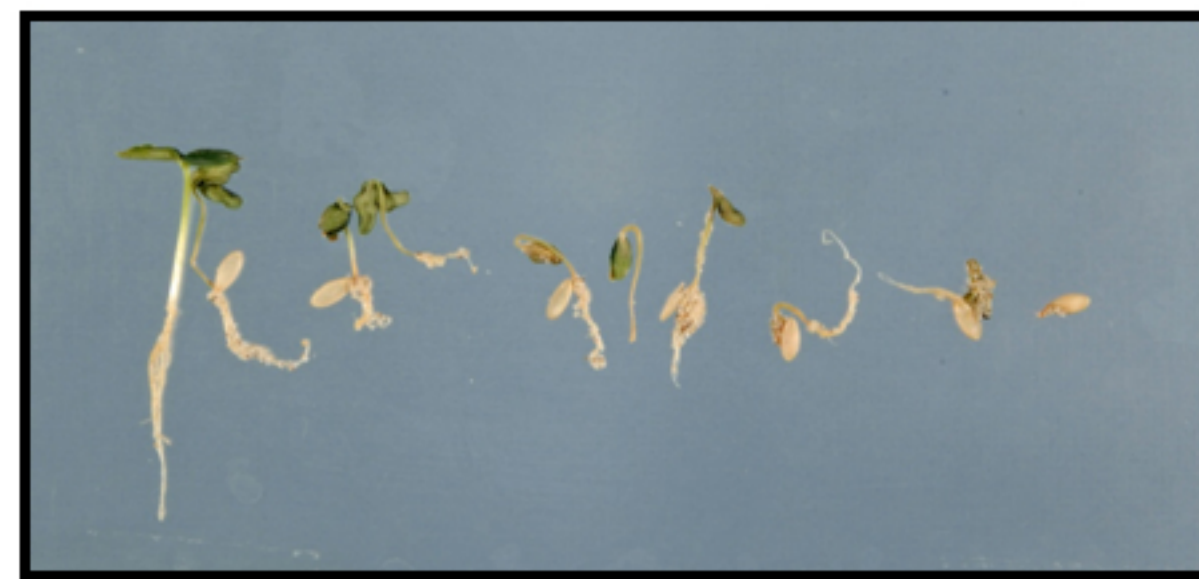
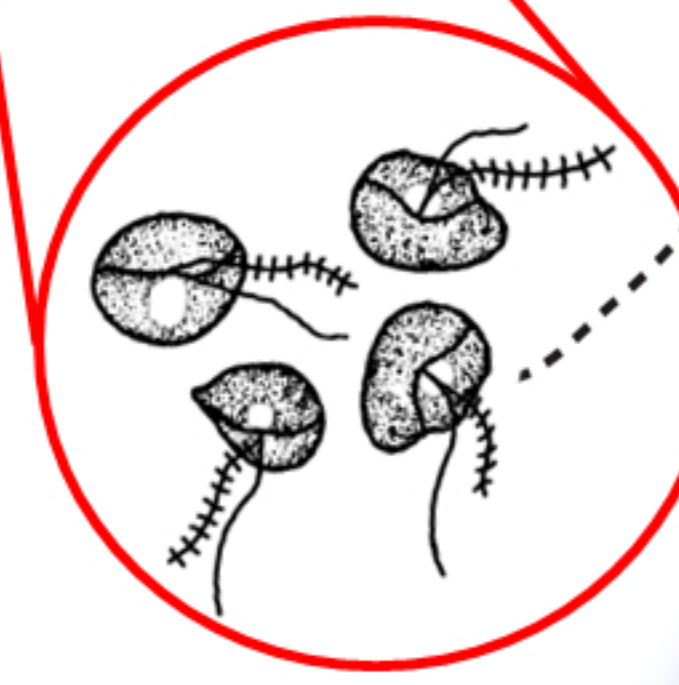
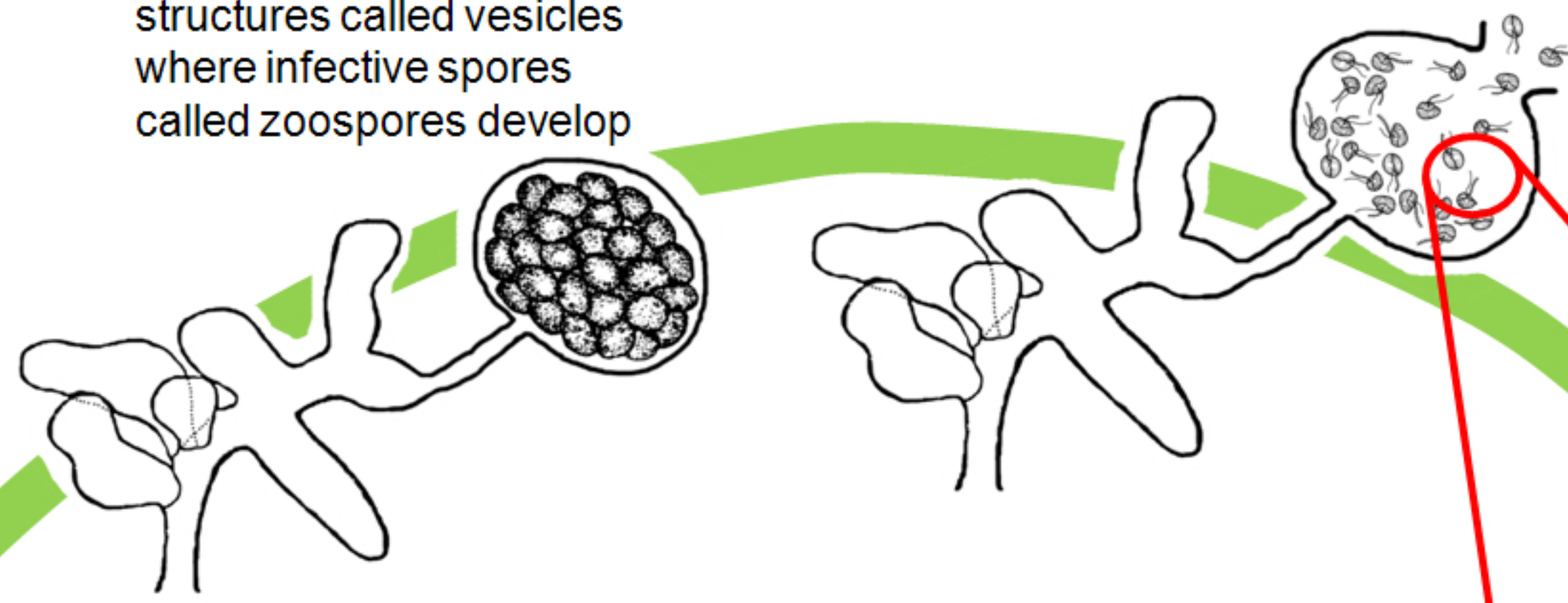
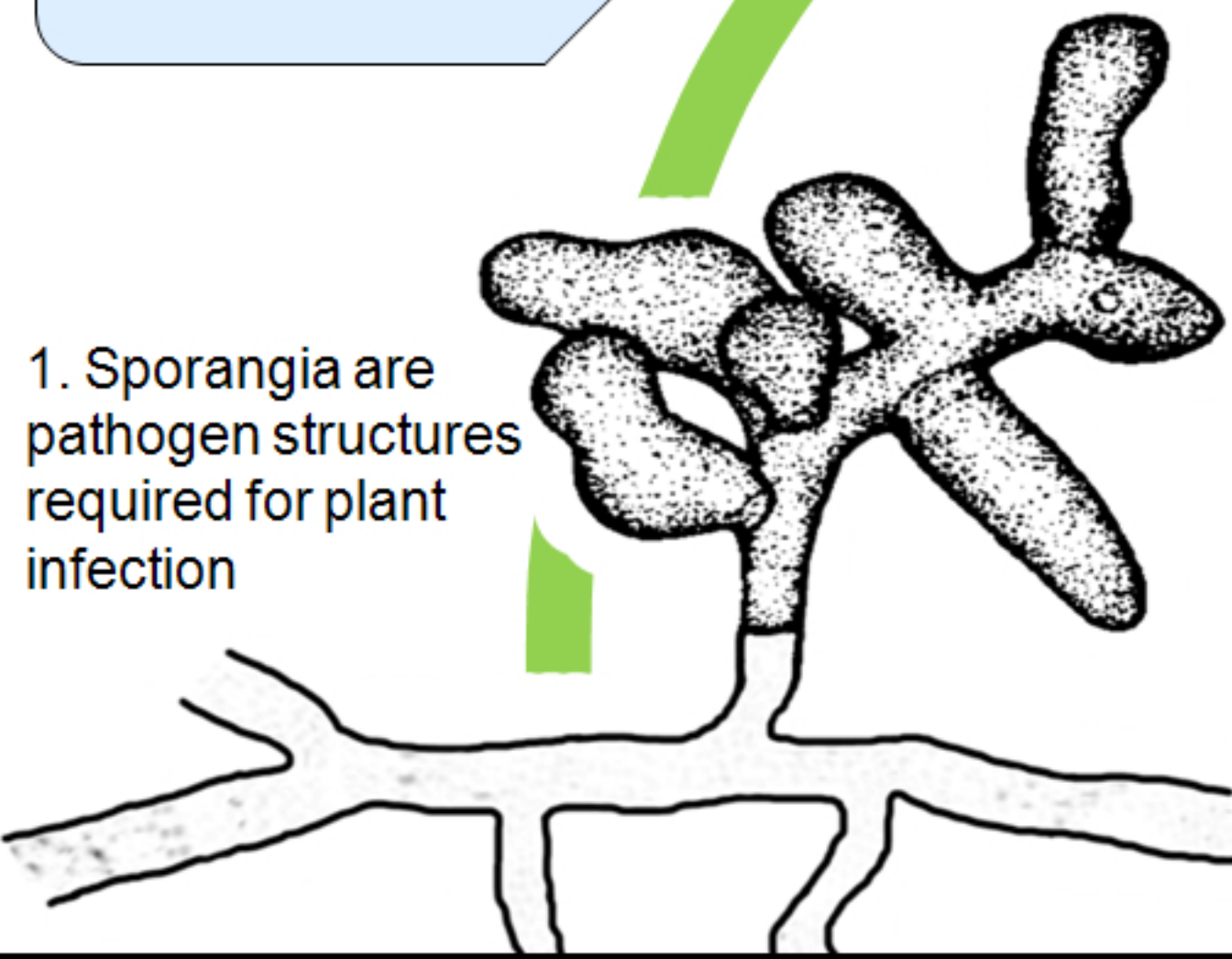
2. Sporangia produce structures called vesicles where infective spores called zoospores develop

3. Zoospores are swimming spores that are released from vesicles into the soil. Zoospores are the primary infective stage of the pathogen

4. Zoospores detect the presence of the plant using chemical cues released from seeds (blue zone surrounding seed). Zoospores swim in a zig-zag fashion to the seed surface

5. Once zoospores reach the seed surface they germinate and directly penetrate and kill the seed

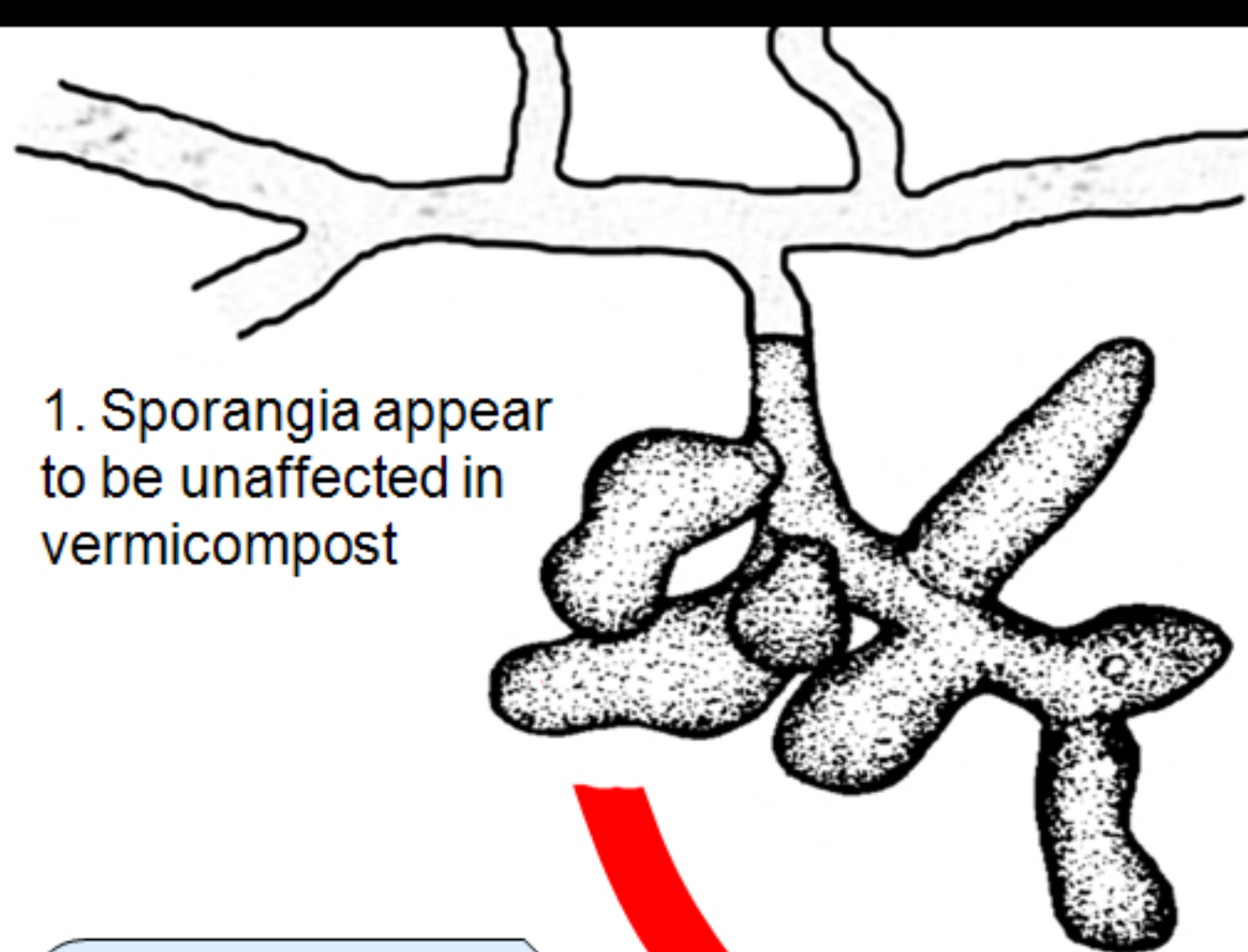
1. Sporangia are pathogen structures required for plant infection



WITHOUT VERMICOMPOST = DISEASE

WITH VERMICOMPOST = NO DISEASE

1. Sporangia appear to be unaffected in vermicompost

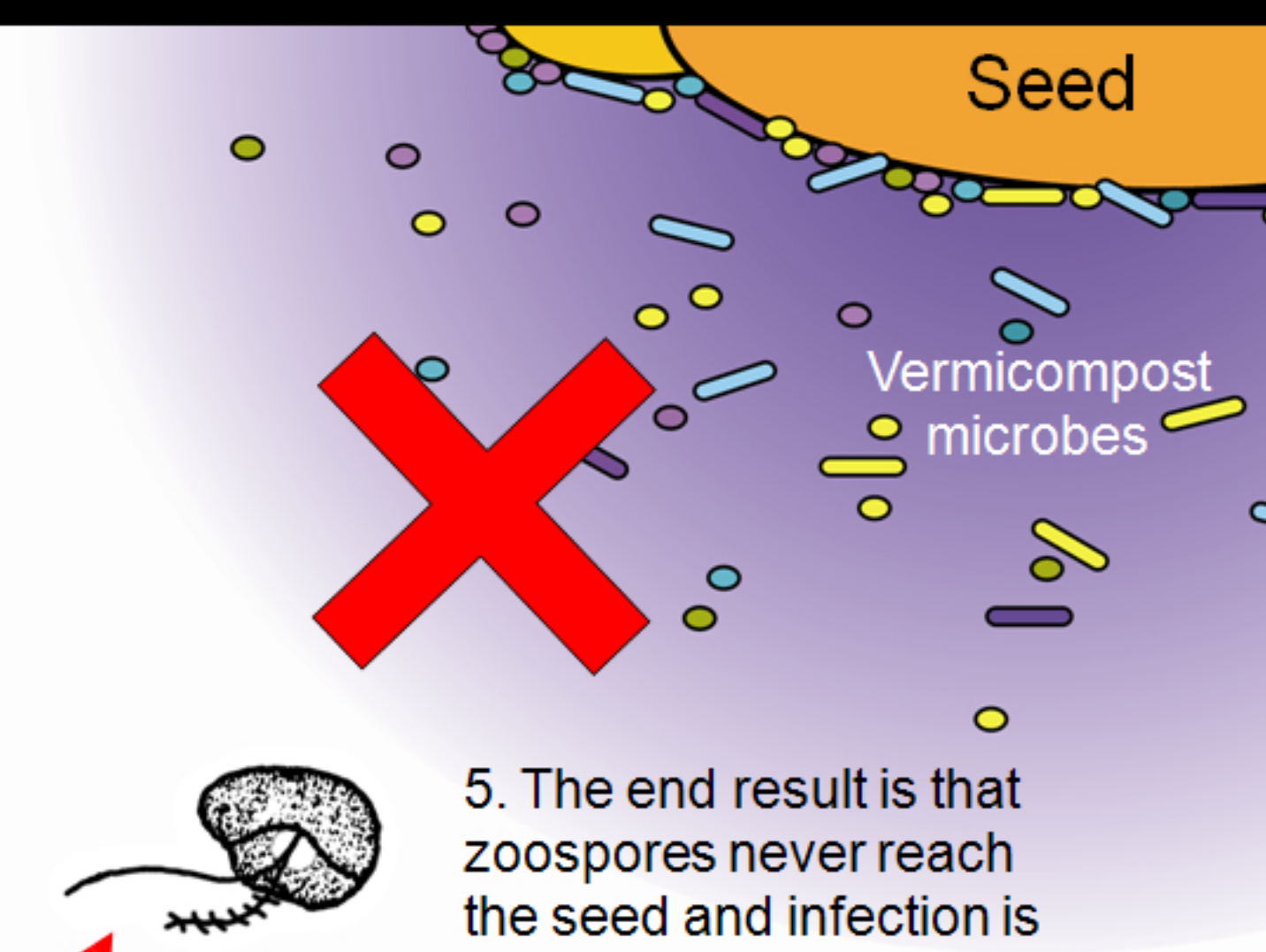


2. Fewer vesicles form in the presence of vermicompost

3. Those vesicles that do form produce few to no healthy zoospores

5. The end result is that zoospores never reach the seed and infection is prevented!

4. Zoospores that may be released are unable to locate the plant because vermicompost microbes alter the chemical cues (purple zone surrounding the seed), making them unattractive to zoospores



Conclusions & Significance

Two stages of pathogen development are impacted by vermicompost. Fewer zoospores are released from vesicles and zoospore swimming behavior is altered by seed-colonizing microbes from vermicompost. Understanding these mechanisms of biological disease control can help in the development of effective alternatives to chemical pesticides.