

Plant starch plays an important role in sporosorus formation by *Spongospora subterranea* f. sp. *subterranea*

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Powdery scab, caused by the soilborne protist *Spongospora subterranea* f. sp. *subterranea* (Sss) (Plasmodiophorales, Phytomyxea), poses significant challenges to global potato production. Symptoms of this disease include skin blemishes and root galls. Sss produces resting spores in sporosori, characterized by robust cell walls that confer resistance to degradation and desiccation. Among the Plasmodiophorids, Sss produces the most elaborate sporosorus structures, which are sponge-like aggregations composed of many resting spores. Sporosorus formation within root galls was investigated, using scanning electron microscopy and light microscopy. Starch grains accumulated during early stages root gall development, and these gradually diminished as the galls matured to brown colour containing fully formed sporosori. Light microscopy of ultramicrotome sections showed presence of high-amylopectin starches enveloped by plasmodia as precursors to sporosori, indicating involvement of starch in sporosorus formation. Reduced total starch levels in galls and infected roots compared to healthy roots indicated that starch was consumed during gall maturation. Gene expression analysis revealed downregulation of starch-degrading enzymes and upregulation of starch synthesis-related genes in the infected roots, suggesting pathogen-mediated manipulation of starch homeostasis for sporosorus development. These results indicate that Sss manipulates starch homeostasis to its advantage for sporosorus development within host root galls.