

Extracellular hydrolase enzyme production by soil fungi from King George Island, Antarctica

Abstract

Various microbial groups are well known to produce a range of extracellular enzymes and other secondary metabolites. However, the occurrence and importance of investment in such activities have received relatively limited attention in studies of Antarctic soil microbiota. In order to examine extracellular enzyme production in this chronically low-temperature environment, fungi were isolated from ornithogenic, pristine and human-impacted soils collected from the Fildes Peninsula, King George Island, Antarctica during the austral summer in February 2007. Twenty-eight isolates of psychrophilic and psychrotolerant fungi were obtained and screened at a culture temperature of 4°C for activity of extracellular hydrolase enzymes (amylase, cellulase, protease), using R2A agar plates supplemented with (a) starch for amylase activity, (b) carboxymethyl cellulose and trypan blue for cellulase activity or (c) skim milk for protease activity. Sixteen isolates showed activity for amylase, 23 for cellulase and 21 for protease. One isolate showed significant activity across all three enzyme types, and a further 10 isolates showed significant activity for at least two of the enzymes. No clear associations were apparent between the fungal taxa isolated and the type of source soil, or in the balance of production of different extracellular enzymes between the different soil habitats sampled. Investment in extracellular enzyme production is clearly an important element of the survival strategy of these fungi in maritime Antarctic soils.