Arrhenian growth thermodynamics in a marine-derived tropical *Fusarium equiseti* and polar *Pseudogymnoascus* spp. in a liquid culture system

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**ABSTRACT**

We hypothesised that the activation energy (\(E_a\)) of growth in a marine-derived tropical strain of *Fusarium equiseti* and polar strains of *Pseudogymnoascus* spp. grown for 10 days in a liquid culture system comprised of seawater Mueller-Hinton Broth would differ across the same experimental culture temperature range. The specific growth rates (SGRs) obtained from these experiments were fitted into third-degree polynomial and Brière-2 temperature-dependent models to estimate optimum temperatures for growth (\(T_{opt}\)) and maximum SGR (\(SGR_{max}\)) of the selected strains. Estimates of SGR values from the Brière-2 model were used to calculate the temperature coefficient (\(Q_{10}\)) and \(E_a\) for growth in all three fungal strains across the experimental culture temperature range. Our findings indicated that *F. equiseti* is better adapted to utilising higher levels of thermal energy for growth than either *Pseudogymnoascus* strain, consistent with general definitions that classify the former as a mesophile and the latter as psychrophiles. A progressive increase in pH was recorded in the liquid culture system during the growth of *F. equiseti* and *Pseudogymnoascus* spp., suggesting that these strains could tolerate more alkaline conditions for growth until nutrient resources were exhausted, as has been noted in some other fungal studies.

1. **Introduction**

Fungi adapt to the availability of thermal energy in the environment. A diverse range of species can be given a thermal classification based on their thermal optima and range for growth, which often reflects their distribution across the globe. The four conventional thermal classes of microorganisms in relation to their growth temperature optima are: (i) psychrophy (≤15°C), (ii) mesophily (25–40°C), (iii) thermophily (45–80°C), and (iv) hyperthermophily (>80°C). Microorganisms that exhibit optima between 20 and 40°C but have maximum (lethal) temperatures ≤50°C are termed as psychrophiles. A progressive increase in pH was recorded in the liquid culture system during the growth of *F. equiseti* and *Pseudogymnoascus* spp., suggesting that these strains could tolerate more alkaline conditions for growth until nutrient resources were exhausted, as has been noted in some other fungal studies.