Mycelial Pellet Morphology and Pigmentation of Selected *Penicillium* and *Talaromyces* Species Vary With Culture Medium Mineral Composition

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Abstract

Penicillium and *Talaromyces* species produce secondary metabolites and pigments that respond to nutrient availability, yet how medium mineral composition shapes mycelial pellet phenotype across multiple species has not been systematically compared in liquid culture. Eight standard strains, *Penicillium citrinum*, *Penicillium glabrum*, *Penicillium griseofulvum*, *Penicillium oxalicum*, *Talaromyces purpurogenum*, *Talaromyces funiculosus*, *Talaromyces islandicus*, and *Talaromyces verruculosus*, were grown on four liquid media in both original and modified compositions. Original formulations contained a trace metal solution (zinc sulfate and copper sulfate); modified versions replaced or supplemented this with a Czapek mineral concentrate (sodium nitrate, potassium chloride, magnesium sulfate, and ferrous sulfate). The four liquid media represented a range of carbon source complexity: malt extract-peptone-glucose broth, Czapek Yeast broth, malt extract broth, and a minimal sucrose-based basal broth. All strains exhibited medium-dependent differences in mycelial pellet morphology and pigmentation. *Talaromyces purpurogenum* showed the sharpest contrast, producing bright red mycelial pellets on several media but near-black mycelial pellets on Czapek Yeast broth. *Talaromyces islandicus* and *Talaromyces verruculosus* generated intensely colored diffusible pigments that varied markedly between original and modified formulations. Growth was most restricted on the minimal sucrose-based liquid medium across all strains. These phenotypic differences suggest underlying variation in secondary metabolite biosynthesis. Culture medium supernatants from both formulation types will therefore be subjected to comparative bioactivity profiling, including antimicrobial, antioxidant, antidiabetic, anti-inflammatory, anticholinergic, and cytotoxic assays. Supernatants exhibiting differential activity will constitute a screening library for subsequent chemical characterization aimed at identifying bioactive compounds with therapeutic potential.

Keywords: *Penicillium, Talaromyces*, mycelial pellet morphology, pigmentation, culture medium