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Catabolic route for 3-guanidinopropionic acid utilization by *Aspergillus niger*: Involvement of 4-guanidinobutyrase

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Aspergillus niger is a metabolically versatile filamentous fungus that utilizes various guanidinium compounds as nitrogen source. The fungus utilizes 4-guanidinobutyric acid (GB), whereas its lower structural homologue 3-guanidinopropionic acid (GP) is very poorly metabolized. The enzyme 4-guanidinobutyrase (GBase) facilitates GB catabolism in this fungus. There is no specific 3-guanidinopropionase (GPase) in *A. niger* but the purified GBase itself exhibits low GPase activity. Based on these observations we hypothesized that the inability of the fungus to mobilize GP as a nitrogen source is because GP is a poor GBase substrate. Two strategies were employed to test this; one was to increase the mycelial GBase levels and tailoring the GBase specificity towards GP was the second approach. A constitutive expression of GBase in *A. niger* resulted in normal growth on GP indicating that intracellular GBase levels essentially limit GP utilization in this fungus. There was a direct correlation between growth on GP and cellular GBase levels. In the second approach, altering GBase substrate specificity was attempted. *A. niger* spores were exposed to ethyl methane sulfonate (EMS) and the mutants were selected through differential growth on GP versus GB. One mutant that better utilized GP than the parent strain was selected and analyzed. Neither an increased GBase activity nor a specific GPase activity was observed in this mutant. Furthermore, no mycelial GPase activity was detected when the mutant was grown on GP. The presence of urea in the spent media when the mutant was grown on GP however implicates a GPase. The possibility of an alternate route for GP catabolism, not involving a GBase needs further study.

Biography

Tejaswani Saragadam is an Integrated MSc-PhD student working under Professor N S Punekar at IIT Bombay. She is working on the aspects of enzymology and metabolism in *Aspergillus niger*, an industrially well-known fungus for citric acid production and various enzymes. Understanding the nitrogen metabolism in this fungus and studying new pathways and enzymes involved in nitrogen metabolism forms her major work. Further characterizing these enzymes and understanding their role in the novel metabolic pathways forms the basis of her study.

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