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The Measurement of Fungal Growth in Solid Substrates

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ABSTRACT

Measurement of the growth of fungi in solid substrates provides valuable information for several aspects of mycology. Fungi grow in, and colonize, various forms of living and dead plant and animal tissue and various byproducts derived from these. Fungi may be present as monocultures in axenic conditions, e.g., pure cultures grown on cellulosic substrates. The degree of complexity of both the substrate and the associated fungal and other microbial populations may also increase, e.g., fungi colonizing leaf litter.

Several methods can be used to measure fungal growth in solid substrates. The basis of most of the methods is the measurement of a chemical component characteristic of the fungus and not the substrate. The current methods available, their applicability to axenic or nonaxenic cultures, their detection sensitivity, and instrumentation requirements are described.

Three of these methods have been used to estimate biomass of the mycelium of the edible mushroom *Agaricus bisporus* colonizing various solid substrates including composted wheat straw, plant seeds, crystalline cellulose, and suspensions of killed bacteria. The methods utilized were assay of the quantity of a growth-linked enzyme, laccase, and the quantities of chitin and ergosterol. All three methods gave good correlations with fungal biomass produced in soluble media.

Laccase extraction and assay were extremely rapid, but since laccase may be subject to regulatory control, other methods were used to see if the biomass estimates were realistic. Chitin and ergosterol assays gave estimates of similar magnitude to laccase for growth of *A. bisporus* on autoclaved rye seeds. Chitin assay was found to be lengthy whereas ergosterol assay was rapid and easy to quantitate by spectrophotometry or high pressure liquid chromatography (HPLC). It is suggested that ergosterol assay is a method of wide application, but where possible other biomass assays should be used.

REFERENCES

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