0273-2289/84/0600-0369$02.00

Effect of Primary Metabolites on Protein Utilization by *Agaricus bisporus*, *Coprinus cinereus*, and *Volvariella volvacea*

H. M. KALISZ, D. MOORE, AND D. A. WOOD

Department of Botany, The University, Manchester, UK, and Department of Plant Pathology and Microbiology, Glasshouse Crops Research Institute, Littlehampton, West Sussex, UK

ABSTRACT

Protein is probably a major nitrogen constituent in the natural habitats of basidiomycete fungi. The ability of two commercial crop species, *Agaricus bisporus* and *Volvariella volvacea*, and a common weed, *Coprinus cinereus*, to degrade protein was investigated.

Mycelia were incubated at 25°C in static liquid cultures on completely defined media supplemented with 1% (w/v) soluble casein as the protein source. Glucose, ammonium, or sulfate were added as alternative sources of the major elements. Tests were also made on media devoid of protein.

Alternative nitrogen or sulfur sources had little or no effect on the rate of protein degradation, pH, medium glucose, or ammonium concentrations or mycelial dry weight yields. However, addition of glucose affected these parameters markedly, with a 3–4-fold increase in the dry weights of all three organisms and a two-fold increase in the rate of protein degradation by *C. cinereus* and *V. volvacea*. *A. bisporus* degraded protein at the same rate in both the presence or absence of glucose. Growth of the organisms was similar whether glucose or protein was the sole source of carbon.

With glucose present, the pH decreased during the early stages of growth, being correlated with glucose utilization. Upon glucose disappearance, the pH increased in the presence of protein, but no subsequent change occurred with the glucose as a sole carbon source. In the absence of protein, the pH decreased to pH 3. At this pH no subsequent changes occurred in dry weight yields, glucose, or ammonium. With protein present, changes in medium ammonium concentration were correlated with dry weight yield, protein utilization, and pH.

Thus, a strong correlation appears to exist between protein and glucose utilization and changes in pH and ammonium as well as dry weight yield. The increase in medium ammonium is probably caused by the deamination of the protein in the absence of glucose and its utilization as an energy source. However, the protein is utilized as efficiently as is glucose as a sole source of carbon.