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Mineral Uptake by First Flush Mushrooms (*Pleurotus* spp.) Cultivated on Various Agro-Processing Waste

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The use of agro-processing waste as raw materials for mushroom production was investigated to define a strategy for bioconverting these wastes into edible basidiomata and, hence, retrieve some of the lost nutrients. Sampled wastes (corn cobs and maize bran, cocoa husk and shells, oil palm fiber, empty bunch and kernel cake, spent malt, pito mash, yam, cassava, cocoyam, potato and plantain peelings, rice husk and bran) from both industrial and traditional agro-processors were characterized chemically and formulated into media. In all, 10 formulations were derived. Two species of *Pleurotus*—*P. ostreatus* (strain EM_1) and *P. eous* (strain OT_3)—were used for substrate evaluation. During this cultivation process the ability or lack of these species to take up minerals (Ca, Cu, Fe, Mg, Mn, P, K, and Na) from the formulated media was investigated.

Mineral absorption by the first flush mushrooms during growth on the various media was determined and compared to the amount present in the original and spent media. Ca, Cu, Fe, Mg, Mn, and P were determined using a Perkin Elmer 3110 Atomic Absorption Spectrometer. K and Na were determined using a Jenway PFP7 Flame Photometer. Analysis of variance between the various determinations was done. The correlation between concentration of elements and total yield was also investigated. There was uptake of all the minerals determined, as present in the media, by the first flush mushrooms. Intake, however, of elements by mushrooms differed considerably among the various minerals to the extent that, although mushrooms might be observed to behave almost as a filter for some elements, they accumulate others. The data suggested that K and P had the highest concentrations in the mushrooms, while Mn and Ca had the lowest. Mg, Ca, Mn, and K concentrations were lower in the mushrooms compared to the initial and exhausted media, indicating that there was no appreciable accumulation after their infiltration into the mushrooms. There was appreciable accumulation of Cu, as the concentration in the mushrooms was higher than in the initial media. The concentration of P in mushrooms was comparable to that of the initial media. There was accumulation of Na in the mushrooms and the concentration was comparable to that in the exhausted media. The concentration of K was generally high compared to the other minerals. Calcium was not significantly present in the mushrooms analyzed despite its high concentration in the formulated media.

The highest colonization rates and sporophore yields were achieved from corn cob and cocoa husk-based substrates, whereas lesser yields were produced from rice husk-based media. Yield from tuber-based (cassava, yam, and cocoyam peelings) media could not be relied upon due to contamination that resulted in incomplete spawn run. There was generally no correlation between mineral uptake and yield.

The study generally demonstrated the ability of *Pleurotus* to absorb these elements during cultivation, albeit to varying extents. Hence, through controlled addition of specific minerals to substrates on which mushrooms are cultivated, the elements can be absorbed by the growing mycelium, and translocated to the sporophores. The mushrooms then could become good or even excellent sources of these minerals.