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Quantitative and nutritive significance of two mushroom-mycelia in respect of mineral content growing on agro-waste

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Like vitamins, mineral content in the mushroom is an important factor in determining nutritive value. Mineral content in a mushroom may sometimes be directly dependent on the amount of that nutrient present in the agro-waste like substrate like rice straw dust. In both *Pleurotus ostreatus* and *Volvariella volvacea*, mycelial dry weight as well as mineral content progressively increased with time of incubation, reached maximum after 30 days and then decreased thereafter. The former one showed much higher amount of four minerals like phosphorus, calcium, magnesium and iron than the latter.

Key words : Agro-waste, carbon source, straw dust, minerals, phosphorus, calcium, magnesium, iron, *Pleurotus ostreatus*, *Volvariella volvacea*.

INTRODUCTION

Mushrooms are gourmet's delight constituting the choicest of savory delicacies containing valuable source of protein, vitamins and minerals. The fungal hyphae are composed of mainly 95% non-metallic elements, like hydrogen, oxygen, carbon, nitrogen, sulphur, phosphorus, sodium, potassium, a lesser amount of calcium and a very low amount of iron (Crisan and Sands, 1978). Mineral content in mushrooms may sometimes be directly dependent on the amount of that nutrient present in the substrate and their availability to the fungus. Determination of mineral constituents of fruit-bodies have revealed that potassium and phosphorus, particularly the former, is one of the main constituents of the ash. Calcium and iron are present generally in low amount (Li and Chang, 1982; Bano and Rajarathnam, 1982; Crisan and Sands, 1978). Mineral content declines, as the mycelium gets older.

MATERIALS AND METHODS

Mycelia of two edible mushrooms, *Pleurotus ostreatus* (Jaq. Ex. Fr.) Kummer and *Volvariella volvacea* (Bull ex. Fr.) Sing maintained on 2% Malt-agar at 27 ± 1°C and 35 ± 1°C respectively.

Production of mycelial biomass of *P. ostreatus* and *V. volvacea* was studied using liquid salt solution-I of Hofsten and Ryden (1975) as a basal medium containing 0.2% phosphoric acid, 0.2% ammonium sulphate and 0.02% magnesium sulphate ($MgSO_4$. $7H_2O$). To the basal medium 2% rice straw dust was added to serve as sole carbon source. The media (50ml) were dispensed in each 250 ml Erlenmeyer flask and inoculated with mycelial disc of identical size punched out from the advancing zone of rapidly growing mycelia of the test fungi on malt-agar (2%) in Petridishes.

Mycelia of the test fungi were allowed to grow on the amended salt-solution-I for 15, 30 and 45 days in complete darkness at 27 ± 1°C for *P. ostreatus* and 35 ± 1°C for *V. volvacea*. After the incubation periods, the mycelia of the two test fungi were harvested and oven dried at 50 °C to constant weights.

Mycelial ash content

5 g of oven-dried mycelium was transferred into previously weighed silica basin. The basin was slowly heated on a low flame on hot plate so that the mycelium got charred. The sample was then transferred to a muffle furnace and heated at 250 °C to complete ash, which was grayish in colour. It was then cooled in a desicator and weighed.

Mineral contents viz., phosphorus, calcium, magnesium and iron were determined in the ash

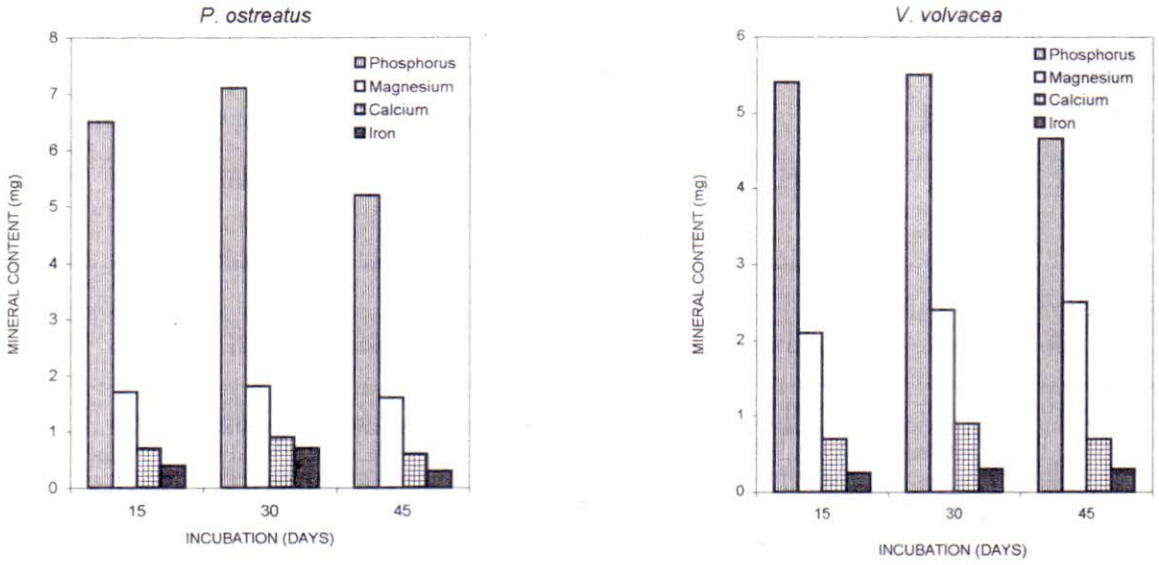

Fig 1. Minerals content in the Mycelium of *P. ostreatus* and *V. volvacea* on salt soution with Straw Dust as carbon source

made from dry mycelium of the test fungi.
The phosphorus content of the mycelial ash was determined following Fiske and Subbrow (1925).
The calcium, magnesium and iron were determined following Piper (1944).

RESULTS

The test organisms showed variable amount of minerals in their mycelium after different incubation periods. Although the mycelial dry weight progressively increased with time of incubation, mineral content in the mycelium was maximum after 30 days but decreased thereafter in both test fungi. Among the four minerals phosphorus content was highest in both organisms followed by magnesium, calcium and iron. Phosphorus content was 6.45 mg in *P.ostreatus* and 4.54 mg in *V. volvacea* after 15 days of incubation and it was maximum (7.10 mg in *P. ostreatus* and 5.50 mg in *V. volvacea*) after 30 days and then subsequently declined. The same trend was evident in other mineral contents.

DISCUSSIONS

Different fungi exhibited different mineral contents in their tissues. Variation occurs even among different species of the same genus. Minerals like, potassium, phosphorus, sodium, calcium and iron content in several species of *Plurotus* was reported to vary considerably (Bano *et al.*,1981). Sporophores of *P.sajor-caju* contained minerals like phosphorus, potassium, sodium, calcium, magnesium, iron (Sivaprakasam, 1987). In this species, phosphorus and calcium content, essential for human nutrition was reported to be higher than in many fruits and vegetables (Arkroyd, 1966). Kawai *et al.*, (1990) experimented with 13 species (17 samples) of wild edible mushrooms growing in woods. Some characteristic trend was found in the mineral contents of the samples belonging to the same family, genus or species. Polyporaceae exhibited lower concentrations of minerals except iron. The mineral contents of *Armillariella mellea* and *Lactiporous sulphureus* were generally high except calcium and iron.
Mushrooms growing in soil exhibited significantly ($P<0.01$) higher concentrations of Cu, Zn, Mn and Hg than those growing on woods. The mushrooms in Tricholomataceae, growing on woods exhibited significantly ($P<0.05$) higher concentrations of Mg and lesser Hg than those growing in soil (Kawai *et al.*, 1990). Bilgrami and Verma (1978) reported high phosphorus content in the ash of fungal structures and the minerals might vary according to the age as well as availability of the element in the surrounding. The present finding is in conformity with their observations.

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