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EFFECT OF ELEMENTS ON THE MYCELIAL GROWTH OF *PLEUROTUS SAJOR-CAJU*

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In the present study the effect of eight elements namely Mg, Ca, K, Cu, Fe, Zn, Mn, and Mo on the mycelial growth of *Pleurotus sajor-caju* was studied. Mg, Ca and K in combination increased the mycelial growth by 21% and Cu, Zn, Mn, Fe and Mo in combination increased the mycelial growth of the fungus by 25%. All the macro- and microelements were found to have better stimulatory role on the mycelial growth of the fungus when given in combination than singly.

INTRODUCTION

Stoller (1941) showed that media supplemented with Al, Fe and Mn enhanced the growth of mushroom mycelium. Humfeld and Sugihara (1949) showed that supplementation of P, K, S, Mg, Fe and Zn in the liquid medium was necessary for good growth of *A. campestris*. It was found by Falanghi *et al.* (1964) that Fe, S, Zn, P and K had no effect on growth of *Tricholoma nudum* but Mg stimulated the growth by 17% and also increased the protein production by 11%. Jandaik (1976) reported that *P. sajor-caju* grew best in medium with ferrous sulphate. Chandra and Purkayastha (1977) reported that *A. campestris* grew well in Mg. depleted medium and the medium without Cu and Fe was most su table for the growth of *Volvariella volvacea* and *Lentinus subnudus*. Kosaric and Nabuo (1981) reported that both K and Fe were required in the cheese whey medium for the growth of morel mushrooms. Meischhans (1981) showed that Cd enhanced the growth of *Agaricus abruptibulus* by 80%. Prikhod'ko (1982) reported that Al, Fe, and Mg (as sulphate salts) when applied at the rate of 0.5g/l in a medium enhanced the growth of *A. bisporus*. Rao (1983) reported that *Agaricus trisulphuratus*, *Rhodocybe subgliba* and *Agrocybe praecox* required K and Mg in the medium for their maximum growth.

In the present investigation the effect of macro- and micro-elements on the mycelial growth and yield of crop by *Pleurotus sajor-caju* has been reported.

MATERIAL AND METHODS

The tissue culture of *P. sajor-caju* was prepared from fresh sporocarp of the mushroom obtained from local area during rainy season. The cultures were made on 3% malt agar medium and maintained in the same medium by sub-culturing regularly at 25 days intervals. The cultures were maintained at 25°C in complete darkness. Glucose-asparagine medium (Lilly and Barnett, 1951) was used as basal synthetic medium without the salts of iron, zinc and manganese.

Preparation of inoculum

A small portion of actively growing mycelium from agar slants was aseptically transferred to a 250 ml Erlenmeyer flask containing 50 ml of basal liquid synthetic medium (sterilized) and was incubated on a shaking incubator (120 rpm) at 30°C (± 1°C) for 7 days in complete darkness. After the incubation period the mycelial mat was aseptically fragmented into small pieces with the help of waring blender. Fragmented mycelial mass was then washed several times with sterile distilled water to remove any trace of medium and suspended in a phosphate buffer medium (*p*H 5.5) for 24 hours to over come the shock encountered during blending. One ml of this mycelial suspension was then used as inoculum.

Growth condition

50 ml of the liquid synthetic basal medium was taken in each of 250 ml Erlenmeyer flask, *p*H of the medium adjusted to 5.5 by 0.2M phosphate buffer, plugged and sterilized at 10 lbs. p.s.i. for 20 minutes. The flasks were then inoculated with 1 ml of mycelial cell suspension of the test-fungus and incubated (120 rpm) in complete darkness for 15 days. Several flasks were inoculated in order to have five replicates of each treatment.

Measurement of growth

After 15 days of incubation period, the five flasks for each treatment were harvested. The medium and mycelium was separated by filtration through a tared sintered funnel (Jena IG-3). The filtered mycelium was washed repeatedly with distilled water to make it free from any trace of adherent medium and dried to constant weight at 60°C in an oven. Dry weight of mycelium thus obtained was taken as an index of growth.

Removal of element contamination

To make the growth medium free of any contaminating elements, the following steps were done. The water in this experiment was deionized and double distilled.

The main sources of trace element contaminants were sugar, amino acid and the salts used as medium components. For this, the necessary chemicals were dissolved separately in glass distilled and demineralized water. Each such solution was shaken vigorously with 2% 8-hydroxyquinoline solution in chloroform in a separating funnel once at *p*H 7.2 and again at *p*H 5.2. After each extraction the solution was washed several times with chloroform to wash it free from traces of 8-hydroxyquinoline.

Mg, Cu and K (as So_4) were added as 200 mg/l of the medium and Cu, Zn, Mn, Fe (all as So_4) and Mo (as $Mo0_3$) were added as 0.1 mg/l of the medium. All the chemicals used were of the Analar grade.

RESULTS AND DISCUSSION

The data in Table 1 indicate that Mg, Ca, and K have stimulatory role on the mycelial growth of *P. sajor-caju*. All the three elements when given in combination, the mycelial growth is increased by 21%. It was also found that Mg and Ca when given jointly increased the mycelial growth by 18% and Mg and K increased the growth by 17%. But Ca and K increased the growth by 13% only. However the elements were found to stimulate the growth of the fungus more effectively when given in combination than on individual basis.

The data in Table 2 reveal that all the five micro-elements namely Cu, Zn, Mn, Fe and Mo stimulated the growth of the fungus and the increased in growth was about 25% more. Mn, Zn and Mo were found to have more better effect than Cu and Fe on the growth of the fungus.

The stimulatory role of Mg on the growth of mushrooms has also been reported by Falanghi *et al* (1964), Chandra and Purkayastha (1977), Rao (1983) and

Table 1. *Effect of macro-elements on the mycelial growth (g/l) of* P. sajor-caju *at 15 days of incubation period*

Macro-elements	Dry weight of mycelium (g/l)*	Increase (%) over control
Mg	2.980±0.050	18.25
Ca	2.860±0.065	13.49
K	2.780±0.070	10.31
Mg+Ca+K(CM)	3.050±0.080	21.03
CM– Mg	2.870±0.040	13.88
CM—Ca	2.960±0.035	17.46
CM—K	2.980±0.085	18.25
Control	2.520±0.025	

*Data are average of five separate experiments run under identical conditions.

Prikhod'ko (1982). The present findings did not agree with the observations of Chandra and Purkayastha (1977) and Kosaric and Nabuo (1981) about the stimulatory role of Cu and Fe. This differences might be due to the different fungi used by the authors. However, the present finding agree with the observation of Kosaric and Nabuo (1981) about the role of K.

Table 2. *Effect of micro-elements on the mycelial growth (g/l) of* P. sajor-caju *at 15 days of incubation period*

Micro elements	Dry weight of mycelium (g/l)*	Increase (%) over control
Cu	2.760±0.060	9.51
Zn	2.800±0.080	11.11
Mn	2.910±0.072	15.47
Fe	2.750±0 060	9.1
Mo	2.780±0.055	10.31
Cu+Zn+Mn+Fe+Mo(CM)	3.150±0.112	25.0
CM -Cu	3.010±0.036	19.44
CM—Zn	2.900±0.092	15.1
CM—Mn	2.820±0.044	11.90
CM—Fe	3.050±0.056	21.03
CM—Mo	2.860±0.046	13.29
Control	2.520±0.045	

*Data are average of five separate experiments run under identical conditions.

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