

## Short Communication

### Iron Ore Solubilization by *Penicillium restrictum*: Effect of Carbon Source and Incubation Days

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**Abstract:** An experiment was carried out to evaluate the Fe solubilising properties of *P. restrictum* when grown in different carbon source and incubation period. Addition of 1% sucrose and manitol enhanced the iron solubilization upto 30 days. Dextrose and starch were most preferred carbon source and exhibited 24.40  $\mu\text{g/ml/g}$  and 28.64  $\mu\text{g/ml/g}$  Fe content with in 15 days of incubation period. Longer incubation period did not show significant ore solubilization and release of Fe content in culture filtrate. Changes in pH of the culture filtrate of all experimental set up due to carbon sources could also be observed.

**Key words:** *Penicillium* • Iron • Ore solubilization

#### INTRODUCTION

Microbes have mainly been used for the production of antibiotics, enzymes and organic acids until now, however, their ability to solubilize metals from solid materials has opened up completely new prospects for their application in mineral biotechnology for metal leaching from low grade ores [1]. In the present study, *Penicillium restrictum* was isolated from mines of Orissa and evaluated for its iron leaching properties. During screening it was the best fungi among other fungi screened for the purpose. Therefore, this fungal culture was taken into account to evaluate its efficiency and requirement of carbon sources for the production of acidic metabolite so that it could solubiliser more iron from the ore.

The pure culture fungus was grown on Czapeck dox medium of 5.5 for the preparation of fresh culture. The culture disc of 10 mm of 6 days old culture were inoculated into Curries broth of 5.5 pH (added with 1% carbon sources viz., Starch, dextrose, lactose, sucrose and manitol separately) with and without added with iron ore (Obtained from Joda mines of Orissa) at rate of 1g 25 per ml and incubated for 15, 30 and 45 days at 30°C. After incubation period, culture filtrate were collected and measured for Iron content [2]. To an aliquot of culture filtrate water was added upto 6.5 ml followed by 1.0 ml 30%  $\text{H}_2\text{SO}_4$ , 1.0 ml potassium persulphate solution and 1.5 ml 40 % KCNS solution. The red colour developed

was measured within 20 min at 540. The quantity of iron present in the culture filtrate was calculated in terms of  $\mu\text{g ml}^{-1} \text{g}^{-1}$ .

*Penicillium restrictum* showed iron solubilization properties in medium of different carbon sources (Fig. 1). In general this fungi have been reported well for their acidic metabolite production and used in ore solubilization [3,4]. The decrease in pH of the culture filtrate as observed in the present study indicated the occurrence of acid content in the culture filtrate that has produced by the inoculated fungi. It showed higher iron content in starch (28.64  $\mu\text{g ml}^{-1} \text{g}^{-1}$ ) and dextrose (24.40  $\mu\text{g ml}^{-1} \text{g}^{-1}$ ) and poor and / or moderate iron leaching in other carbon sources. Present work is important as several reports are available for bioleaching of different heavy metals from ores but very few reports are available on iron leaching phenomenon ore [5].

The gradual increase in iron content of the culture filtrate with respect to incubation period was observed in the presence of lactose only where as in presence of other carbon sources it was decreased after 15 days of incubation period. Results suggested that incubation period may also reflect the outcome of microbial secondary metabolism. The potential of fungi to serve for iron solubilization and/or adsorption is clearly exhibited in this study. However, this experiment used a limited parameter and did not mean to prove that media and incubation period can only be the factors rather indicate towards further research.

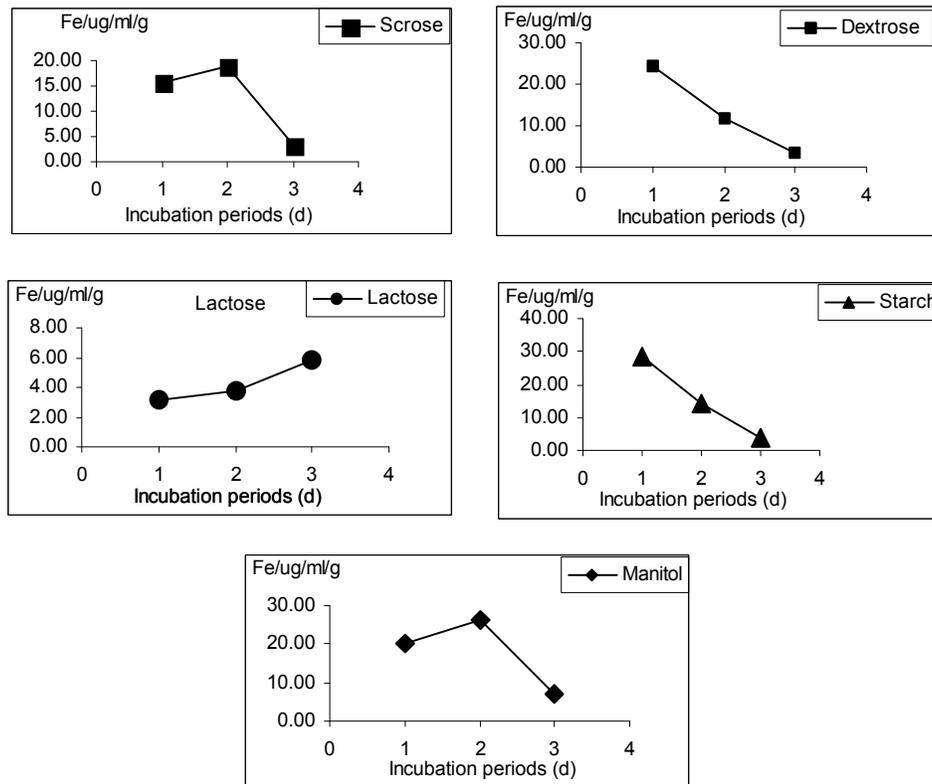


Fig. 1: Solubilization of iron ore by *P. restrictum* in different incubation period and carbon sources Abbreviations 1=15 days, 2=30 days, 3=45days

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