Abstract theme – Biological Science

Bioethanol production: a co-culturing approach of yeast with cellulolytic fungi

Tharindya Mudalige[1],Sandhya Jayasekara[2],Renuka Ranayake[3] and Sepali Kotalawala[4]

[1,4]*Business Management School, 591, Galle Main Road, Colombo 06.*

[2,3]*Bioenergy & Soil Ecosystems Research Project, National Institute of Fundamental Studies, Hantana Road, Kandy.*

e-mail address of corresponding author: sandhya.ja@nifs.ac.lk

Introduction/Aim:
Fossil fuel consumption has given rise to both economic as well as environmental drawbacks. Constant fluctuations in fuel prices destabilize economic statuses in many countries. Being non-renewable energy sources they emit loads of greenhouse gases which create drawbacks in environment *vis*: global warming, destruction in biodiversity and increased sea levels. Utilization of bioethanol has become one of the major sustainable energy sources to replace fossil fuel consumption. The objective of the current study was to investigate the potential of bioethanol production by co-culturing cellulase producing filamentous fungi and ethanol producing yeast isolates.

Methods:
Ten yeast isolates, two commercially available bakery yeast and one industrially utilized ethanologenic yeast type were studied to understand their ethanol production potential in a fermentation medium. Efficient ethanologenic isolates were co-cultured with efficient cellulolytic filamentous fungi *Trichoderma* and *Aspergillus* species using cellulose as the carbon source in a medium for ethanol production. Ethanol production was detected by High-Performance Liquid Chromatography.

Results:
Six wild-type isolates were found to be ethanologenic. The highest quantity of ethanol produced by a yeast isolate was 4.13%. The comparison of ethanol production of wild-type isolates with commercially available isolates revealed that wild type yeasts are more efficient in ethanol production. The cocultures of filamentous fungi with yeast gave 0.1-4.34% ethanol. According to the results the coculture of *Aspergillus* with the commercially available yeast Yuk was found to be more efficient in ethanol production giving 4.34% of ethanol. A significant amount of ethanol was observed in co-culture of wild type Yg with *Aspergillus* (2.5%) and *Trichoderma* (0.8%).

Conclusion:
one-pot saccharification and fermentation by culturing cellulolytic fungi and yeast together could be utilized as an efficient cellulosic ethanol production process.

Keywords: *Aspergillus*, Bio ethanol, Co-culture, *Trichoderma*, , Yeast isolates