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Biological Purifiers
(sajor – caju Oyster mushroom)

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Abstract
Conventional biological wastewater treatment and large amount of low value bacterial biomass. The treatment and disposal of this excess bacterial biomass, also known as activated sludge, accounts for about 40 – 60 % of wastewater treatment plant operation cost. A different form of biomass with a higher value could significantly change the economics of wastewater treatment process. The biomass produced during fungal wastewater treatment process has potentially much higher value than that from the bacterial activated sludge process .The fungi can also be used as a protein source various high- value biochemical can also be used. High value bio chemicals are produced by commercial cultivation of fungi under aseptic conditions using expensive substrates. Food – processing wastewater is an alternative as a source of low cost organic matter and nutrients to produce fungi with concomitant wastewater purification. This review summarizes about production of mushroom from spawn on coconut coir and rice paddy and using them as a biological source for wastewater treatment. The wastewater is passed through the mushroom almost 50 – 80% 0f water is purified. It's not completely but partially purified. Can be used for drinking but mostly used for medical process for gardening etc.

History
1917: Flack described the first successful cultivation of Pleurotus Ostreatus.
1951: Lowhag was the first to grow Pleurotus on sawdust mixtures.
1962: Bano and Srivastava reported mass production on straw – based substrates and work paved the way for large scale commercial exploitation.

Keywords: *Sajor – caju (Pleurotus spp) called as oyster mushroom, coconut coir, rice paddy.*

Introduction

Filamentous fungi are often cultivated in food industry as a source of byproducts such as starch or molasses's. The use of filamentous fungi to treat high – strength wastewater is an alternative option. Fungal proteins and valuable bio chemicals, but it also produces highly dewater able fungal biomass, which can be used as a source of animal feed and potentially in human diets. Fungi can produce a wide range of fine bio chemicals and enzymes are more effective than bacteria in metabolizing complex carbohydrates such as starch. This article is all about purification wastewater through mushroom spp used is sajor – caju it's a *Pleutorus spp* its commonly called as Oyster mushroom. Mushrooms has an ability to purify the wastewater we can be used as a water for supplying external use not as drinkable water**.** This process is very simple and cost is also low so economically its cheaper than other purification

process there is not more materials used which will increase the price. Coconut coir and rice paddy is used as a substrate to grow spawn (seeds). There is no need of external sources of nutritions because all is provived by coir and paddy. Mushrooms can be easily grown on the substrate the growth will be in some days. Once it is grown we can use for the treatment directly as it is. The wastewater treated will be not 100% pure but parcially pure. This process can be used in every school and colleges and even in houses and gardens as the world is suffering from scarcity of water. The waste water can be cooled at one place and passed by mushrooms for several times till there is color change in previous water. Then this water can be again used in college and schools and even gardens for watering the pants or other things rather than drinking. This method can be used for small scale or primary wastewater treatment.

Introduction to Mushroom

The species of mushroom used is sajor – caju its *Pleurotus* its also known as Oyster mushroom. *Pleurotus* comes from a Greek word "*Pleuro"* means formed laterally or sideway position, the species epithet " OSTRETUS" refers to its sheel like aaerance.

Habitat

It is sporophatic or parasitic fungus which grows abundantly on standing and fallen forest plants like alder, cottonwood maple etc. found in river valleys and the fruiting bodies appear in the falls, early winter and spring.

Nutritional Value

91 % Water
9% Dry weight
30.4% Crude protein
109 mg niacin/ 100 g dry weight
It also contains
Iron, Phosphorus, Potassium and Calcium And Vitamin C and Fibers

Classification of Mushroom

Mushroom is a fleshy fruiting body of some fungi arising from a group of mycelium buried in substratum.

Scientic Classification

Kingdom Fungi
Division Basidomycota
Class Agaricomycetes
Order Polyporales
Family Polyporacea
Genus Lentinus
Species L. sajor – caju

Binomial Name

Lentinus sajor – caju.

L. sajor – caju (formely known as *pleurotus sajor – caju*) is a species of saprophytic mushroom.

What is spawn?

'spawn' means the vegetative mycelia network of mushroom developed after the germination of one or more than fungal spores grown on a convenient along with a supporting medium which provides nutrition to the fungus for its growth and development spawn is used as a seedling. It can be stored at 4 – 6 degree for one month.

Coconut Coir (Husk)

Coconut coir is natural fiber extracted from then husk of coconut coir is the fibrous material found between the hard, internal shell and the outer coat of a coconut. Coconut husk are a renewable, biological, and durable, large – scale natural resources. The popularity of characteristics, very good and versatile cultivation tool, water is better retained can absorbs up to 8 times its watering maintence, high aeration, optimal, coconut husk remains stable for than 8 years and because it has a natural rooting hormones as well as anti fungal properties.

Rice Paddy

The paddy is having good combination of all attributes of all like flavor, aroma, delicacy, high content of protein and vitamins and minerals.

Experiment Materials

Spawn (seeds) of sajor – caju, coconut coir, rice paddy, polythin bags, stands. Water spray.

Procedure in Flow Chart

Take rice paddy and coconut coir

⇩

Autoclave it for 15mins at 121c 15psi

⇩

Take a spawn spread on rice paddy and also coconut coir.

⇩

Make layers of it.(i.e rice paddy then spawn then again rice paddy.
Same for the coconut coir.)

⇩

Tie the neck of both the carry bags. And hang them on stands.

⇩

Make wholes on the carry bags so that water can reach inside.

⇩

Everyday spray water on both the carry bags through the wholes.

⇩

Observe the growh.

⇩

Remove the mushrooms as it is fully grown. And use it for the Treatment.

- Autoclave the coconut coir and rice paddy for 15mins for 121c at 15psi. As this is the standard temperature, pressure for autoclave. Autoclave is used for sterilization. It is steam sterilization in which our material won't get distorted. Sterilization is an important step as we are using the coconut coir and rice paddy as a substrate to grow spawn. If there is no sterilization there would b contamination on the growth of mushroom. If the mushroom is contaminated we cannot use it for the treatment of wastewater purification.
- Bed preparation bed preparation is basically making of layers of spawn and rice paddy and coconut coir respectively. Bed preparation is done because there should be enough place for the growth of mycelium. If we spreed all spawn on one layer only there will be no proper growth of mushrooms. Bed is prepaed so that spawn would get proper water and aeration.
- Keep it in dark place because there should be no effect of sunlight on the beds or layers. Aeration and moisture contain is need for the growth.
- Spraying water everyday gives aeration and moist to the beds. Because due to metabolic processes going inside the beds leads to the drying of rice paddy and coconut coir. Metabolic activities like CO2 is released.
- Aeration helps the mushroom to grow. As well as it maintance the temperature and ph.
- After the mushrooms are fully grown open the bag but do not separate the layers. Just remove the mushrooms.
- Now this mushrooms are usefully the next process of purification.
- There are various parts of mushrooms.
- CAP The shape of the cap can be scabby or spherical. Which protects the gills.
- GILLS Where the spores are produced.
- STEM The stem holds up the cap.
- RING Protects the gills.
- VOLVA Holds the immature mushrooms.
- SPORES They are the seeds for new mushrooms.
- HYPHA Tiny threads that come from the spores.
- MYCELLIUM Hyphae that have connected together.

- In all of this parts mycelium is the most important.

Mycelium it is a vegetative structure of fungi. It is a asexual unit. They look for water and nutritions such as a nitrogen, carbon, potassium, phosphorus which the mycelium transfers to the fruiting body soit can continue to produce biomass and grow. It break downs the pollutants like E. coil, pesticides, and oil. They are naturally excellent at filtering nutrients and heavy metals from water.

Pollutant Removal

Removal and detoxification of pollutants can be achieved by physical, chemical, or biological means. However, a biotechnological approach is widely adopted due to its cost – effictivness, higher efficiency, and grneration pf nontoxic

Higher efficiency and generation of nontoxic value added products. Thus a fungal process not only offers a solution to wastewater remediation but also provides an opportunity for byproduct recovery. One of the several advantages of the fungal process is the enzyme mediated activity that provides an solution to the treatment of waste streams containing hazardous or xenobiotic organic pollutants. The enzymes are produced during all phase of the fungal life cycle and are present even at low pollutant concentration. Fungal biomass screacts specific and nonspecific extracellular enzymes that have attracted the attention of many researchers working on degradation of complex high- molecular mass organic pollutants. The extracellular enzymes secreted by white- rot fungi catalyze PAH degradation through nonspecific oxidative reactions leading to the formation of varieties of quinines and hydroxylated aromatic compounds. White- rot produces high oxidative enzymes, such as lignninase, phenol-oxidase, and manganese-peroxidase, that are cable of degrading lignin, phenol, dyes, various other xenobiotic pollutants. *Pleurotus* osteratus that degrades lignocellulosic biomass.

In addition to extracellular enzymes production, fungal cell walls and their components plays a role in biosorption pf toxic compounds during wastewater treatment.

Heavy Metals Absorption

Pleurotus spp have been found to demonstrate a very effective biosorption potential for a wide range of environmental contaminants including heavy metals. The accumulation of heavy metals in the fruit bodies tends to increase with an increase of the metals in the substrate. *Pleurotus spp* has the ability to accumulate heavy metals in high concentration in their bodies. The bioaccumulation potential of P. ostreatus from metal scrap sites has also been valuated for Cu, Fe, Zn, amd Mn. According to the study conducted it has found that accumulation of Cd has been found more. It has been reported that the highest uptake of Cu and Cd as compared to Co and Hg ions by P. sajor- caju.

The pH values of a solution should be considered to be as an important factor impacting the biosorption process. The pH influences the toxicity and solution chemistry of heavy metals. In the research on hybrid of P. sajor – caju and sunflower waste biomass immobilized on sodium alginate, the maxium equilibrium uptake for lead was found to be at Ph 4.5.

Observation

The review is all about the use of mushroom for wastewater treatment as it is a biological method it has been used in various areas for the purification and removal of contaminants. Mushroom is easily grown so the cost is low. It does not require any addition expensive nutrients to be provided. It can accumulate heavy metals easily. It is used in the removal of heavy metals form polluted water, streams. And it is also use in pharmaceutical wastewater treatment.

As mushrooms can be easily obtained and produced in large quantity but then also it is still used as a primary source of water treatment. The main role is played by the mycelium which

accumulates all the contaminants. Mushrooms has many beneficial qualities it is and bioremediation. Use of mushrooms in water purification is cost effective its low cost.

Advantages of Fungi in Wastewater Treatment

A traditional biological wastewater treatment system generates large quantities of sludge (mainly bacterial biomass), which is of low value and expensive to treat before disposal. Meanwhile, fungi are often cultivated in industry as a source of a valuable biochemicals,. Integrating wastewater remediation with recovery of valuable resources may possibly lead to an economically viable solution for sustainable waste management. From these perpectives, the fungal wastewater treatment process can be an attractive alternative that uses a low- cost organic substrate as a feed to generate high value fungal byproduct with concomitant wastewater remediation.

The fungal wastewater treatment process offers several inherent merits, including higher degradation rates of complex organic compounds present in wastewater due to the presence of specific fungal enzymes, efficient solid separation of the fungal biomass from the mixed liquor, and the possibility to recover valuable fungal byproduct.

Conclusion

Filamentous fungi can be used for treatment of a variety of wastewaters, ranging from readily degradable food-processing wastewater to highly polluting recalcitrant Toil processing wastewater. Fungal treatment technology is well suited for resource recovery and fungal and new byproduct development based on the ability of fungi to produce various enzymes, amino acids, and other valuable biochemicals. This review is about the production of mushroom on a substrate. Mushroom used is Pleurotus sajor- caju ssp also known as oyster mushroom. Substrate used is coconut coir. It is used to remove the contaminants from water. Thou it is widely used but still on primary level. Mushrooms has been proved as an biological cleanser or bioremediation.

Interpretation

Various treatments are used for the purification or removal of contaminants there are physical, chemical and biological treatments. In all these treatments mostly now a days researcher goes for biological treatments. As there the organic main source for purification is mushrooms. They are vegetative fungi and have the capability to accumulate heavy metals and pollutants from water because it has the function of accumulating nutrients and water from the substrate it is grown. Mushrooms are easily cultivated the generation time is not more and the production is at higher level. Different species of mushrooms are used for various proposes depending upon their metabolic and enzymatic activity. Today the mostly preferred method used is biological method. The method is convenient as mushrooms are non hazardous. Mushrooms are rich in fibers, carbohydrates they can break down complex compounds to simpler. There are different enzymes which catalysis toxic compounds to non toxic compounds. As all the characteristics proves that mushrooms can purify and remove contaminants from wastewater. Mushrooms are said to be Biolocial Purifiers or Biological Cleansers.

References

1. Manual for developmental workers (mushroom cultivation)
2. DenchevC.M.etal
3. General Aspects of Mushroom Fungi.
4. hhttp://www.researchgate.net/publication/281625151
5. www.anilrana13014.webbly.com
6. Pretorious, W.A (1987). A conceptual basis for microbial selection in biological wastewater treatment. Water Res.,21,891-894

7. Use of filamentous fungi for wastewater treatment and production of high value fungal byproducts.
8. www.journal-phytology.com
9. Nutritional properties of agrocoir.
10. hhtp:// www.bioline.org.br/ja