SECTION 6

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SECTION 7

MISCELLANEOUS
NH₃, -SH, -OH, - COOH etc.) and it is supposed that these are seemingly responsible molecular constituents of the biomass which would be taking part in the uptake process.

The removal of Safranine dye on Rice husk were from 87.2% to 99.6% for decreasing initial dye concentrations (Table 1) and for crystal violet removal from 87.2% to 99.2% respectively in the same order.

The crop being world wide, this waste food material would be easily available and that too at a throw away price. The easy availability of the waste food material would enhance them worthy as removal material.

Efforts will be made to observe the removal capability of activated powder of Rice straw.

**TABLE 1 : Decolourising capability of Rice husk for safranine**

<table>
<thead>
<tr>
<th>Initial concentration 1x10⁴ µg/L</th>
<th>Equilibrium concentration dye 1x10⁴ µg/L</th>
<th>Removed dye g/0.2g</th>
<th>Removed dye %</th>
</tr>
</thead>
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<td>0.4</td>
<td>99.6</td>
<td>99.60</td>
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<td>95.42</td>
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<tr>
<td>200</td>
<td>25.6</td>
<td>174.4</td>
<td>87.20</td>
</tr>
</tbody>
</table>

**TABLE 2 : Decolourising capability of Rice husk for crystal violet**

<table>
<thead>
<tr>
<th>Initial concentration 1x10⁴ µg/L</th>
<th>Equilibrium concentration dye 1x10⁴ µg/L</th>
<th>Removed dye g/0.2g</th>
<th>Removed dye %</th>
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<td>200</td>
<td>25.6</td>
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<td>87.20</td>
</tr>
</tbody>
</table>

**Conclusion**

In addition to surface complexation the exchange of ions are also likely to occur, depending upon the affinity of the ions towards the exchaning sites. Hence, in general, in the absence of apparent precipitation a mixed effect of "ion-exchange" and 'surface complexation' is suggested for the removal path way of dyes on Rice husk.

Highly significant removals by Rice husk indicated its good removal capacity. Thus Rice husk has emerged to be a good decolorising agro-waste material.

**References**

ABSTRACT

Powdered and activated husk of Oryzae sativa was used as adsorbent in the aqueous solutions of Saframine and crystal violet dyes. Adsorption capacity of the husk was highly significant.

Introduction

The abundance of Rice-husk (Oryzae-sativa) has been well documented. Despite its wide consumption as a fuel it still remains as a surplus, which poses a disposal problem for mill owners. On the otherhand, unlike organics, pollutants which are biodegradable, dyes contaminants tend to persist rather indefinitely in the environment, and are eventually accumulated through the food chain thus posing serious threat to plants, animals and men.

The search for biomass for dyes has been well accepted and reported during the past decades. A literature survey reveals that a variety of Agro waste material have been successfully employed in the removals of these dyes. Earlier Tan et al. employed coconut husk fibre and palm fibre for Cr (VI) removal. The uptake behaviour of the Rice (Jaya) husk, in the removal of Zn (II) ions has been suggested by Shuddhodan and Mishra and removal behaviour of Rice (Oryzae sativa) hulls for submicron concentration of Hg and Cr from aqueous solutions was suggested by Diwakar and Mishra. Biosorptive behaviour of casein has been given by R. S. Dubey and Manisha Mishra. Mango bark and Neem bark have effective removal capability, proved by Shuddhodan and P. Mishra. Some work has been published by the authors. The idea has been potentially applied to the removal of some pollutant ions from aqueous waste and industrial effluents, Kapoor and Viraraghavan.

Ground nut husk is reported to be an effective removal agent. Okeimen et al. and Periasamy K. Tea leaves are shown to have a greater tendency to remove dyes from aqueous waste (Tee and Khan). Hence an attempt has been made for the possible utilisation of the surplus Rice-husk and straw to aid the removal of dyes from aqueous solution using spectrophotometric techniques.

Material and Method

The Rice (Oryzae sativa) husk was taken out mechanically from seeds in the usual way, washed repeatedly by doubly distilled water, dried at room temperature then crushed to giving particles of 180 mesh, activated and allowed to cool in a desiccator.

The dyes employed in the present work were safranine and crystal violet. Accurate weighed quantities of the dyes were dissolved in doubly distilled water to prepare stock solutions.

Constituents of Rice husk: It has been reported that Rice husk mainly contains moisture 9.02%, crude proteins 3.27%, fats 1.18%, carbohydrates (by difference) 53.71%, crude fibre 35.68% and ash 17.14%. Moreover the ash content contains various metal oxides such as silica 94.50%, Calcium oxide 0.26%, MgO 0.23%, Sodium oxide 0.78%, K 0.11%, ferric oxide trace and P 0.53% etc.

Experimental section: Solutions of the dyes were made up, containing different amounts of dyes as safranine and crystal violet respectively and adjusted the pH with dil. NaOH. Now activated Rice husk powder (2g) and each of dye solution (10ml) were placed in a 20ml test tube; the tubes were shaken at temperature controlled shaker. Preliminary studies showed that shaking of one hour is sufficient to reach equilibrium. Immediately after shaking, suspensions were centrifuged for 10 min. The dye conc of the supernatant was determined with spectrophotometer. Difference between the amount of dye in supernatant and the amount initially present in the solution was taken as the amount of dye removed by Rice husk.

Result and Discussion

The removal behaviour of Rice husk has been obtained for the uptake of dyes separately in batch experiments. It was found that, dyes showed a great affinity towards the Rice husk surface (up to 100%) under normal conditions.

The effect of conc of dyes on removal process is represented (Tables 1&2) for amounts absorbed at equilibrium increased from 86% to 99% with decrease in adsorptive conc. This increase in % removal is due to the availability of a larger number of surface site of removal agent for a relatively smaller no. of removing species at higher dilutions. The mechanistic aspects of dye removal by Rice husk could be better understood with the help of pH dependence studies on the uptake at identical preconditions. Rice husk contains various proteins/Amino acids (aspartic and glutamic acid, cystine, histidine, lysine, tyrosine, arginine etc.) having active functional groups (i-...
the same order.

Analysis of these tables indicated that adsorption of the dye decreased with increase of concentration. The adsorption at two different temp was in confirmity with the behaviour of temp. towards adsorption.

Highly significant adsorptions by Rice-husk indicated its good adsorptive capacity. Thus the rice-husk has emerged to be a good adsorbent.

References
FLORA AND FAUNA
1998 Vol. 4 No. 1 PP. 17 - 18

ADSORPTION OF SAFRANINE ON ORYZAE SATIVA HUSK CHARCOAL
J.DASSANI AND P.C. SINGHAL

ABSTRACT

Oryzae-sativa husk was procured, carbonised, powdered and activated. The charcoal was used as decolourising agent with Safranine dye. Solutions of different concentrations at 20° & 30°C. Percentage adsorptions were more than 86 in all these cases.

Introduction

Some of the major industries which discharge effluents containing dyes are tanneries, metal-finishing industries, textile mills and industries manufacturing photographic dyes, ink pigments and chemicals. Dyes removal from waste water is considered very essential. The convention often followed to remove dyes from the wastewater includes ion-exchange, solvent-extraction, reverse osmosis, evaporation etc. These methods involve high capital investment and regeneration cost.

Adsorption technique was shown to be highly effective and cheap. A detailed study on dyes removal by palm fruit particles was made. Use of fly ash and human hairs have been reported as adsorbents. Workers have made a study using unio and pila shells as adsorbents. A worker reported the use of Nigerian sub-bituminous coal, palm kernal shell and cow bone.

Researches are seriously directed towards finding out various low cost adsorbents. In order to meet this purpose, rice husk charcoal was used as decolourising agent.

TABLE 1: Adsorption of Safranine on Rice-husk charcoal at 20°C

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Initial concentration of dye 1X10^3 (\mu g.L^{-1})</th>
<th>Equilibrium concentration of dye 1X10^3 (\mu g.L^{-1})</th>
<th>Adsorbed dye (\mu g.0.2g)</th>
<th>Adsorbed dye %</th>
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Materials and Methods

In the present investigation Oryzae-sativa crop waste (Rice-husk) was collected from Rice Mills. After washing well, it was rinsed thoroughly with deionised water and dried. Charcoal was obtained from this rice-husk, thereafter the charcoal was ground, sieved to 180 mesh and activated.

Dye solutions of safranine were prepared in the order of increasing concentration. 25ml of each solution in triplicate was taken in well stoppered bottles and 0.2gm of the prepared charcoal was added in each bottle. Then the bottles were kept in temperature regulated mechanical shaker at 20°C for 30 minutes. After the contact period the bottles were removed and the solutions were filtered. Concentrations of safranine dye in respective filtrates were estimated by spectrophotometer at 510nm.

Results and Discussion

The adsorptions of safranine dye on Rice-husk charcoal at temperature 20°C were from 87% to 99% for decreasing initial dye concentrations (Table 1). At temp. 30°C the adsorptions were from 96% to 98% respectively in

TABLE 2: Adsorption of Safranine on Rice-husk charcoal at 30°C

<table>
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<tr>
<th>S.No.</th>
<th>Initial concentration of dye 1X10^3 (\mu g.L^{-1})</th>
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<th>Adsorbed dye (\mu g.0.2g)</th>
<th>Adsorbed dye %</th>
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</table>
EXPLORATION OF DECOLOURISING POTENTIAL WITHIN AGRO WASTE MATERIAL

J. DASSANI AND P.C. SINGHAL
BIPIN BIHARI COLLEGE, JHANSI (U.P.)

In an environmental context, accelerating pollution by dyes has provided the impetus for the research to replace exiting expensive technologies. Significant release of dye into water bodies through industries has been alarming to environmental scientists prompting them to search for an efficient removal system from waters. Attempts to remove various dyes from water, employing several abundant waste agro materials i.e. Rice husk (Oryzae sativa), Mango bark (Mangifera indica), Neem bark (Azadirachta indica), Casein, soybean hulls (Glycine max) have been made. Our own attempts to see the removal behaviour of Rice husk (Oryzae sativa) for dyes using the spectrophotometric techniques were encouraging. A literature survey reveals that a variety of agro waste food materials have been successfully employed in the removal of dyes and various modes of bioaccumulation have been suggested. The bioaccumulation may proceed mainly through surface complexation with surface active groups.