using the isolated test organisms. The substrates were: Rice straw (*Oryza sativa* L.), Saw dust (*Dustaphobek* L.), Paper, Ragi straw (*Eleusine coracana* L.), Maize cobs (*Zea mays* L.), Maize leaves (*Zea mays* L.),Eucalyptus (*Eucalyptus camaldulensis* L.),Sugarcane waste (*Saccharum officinarum* L.), Teak leaf (*Tectona grandis* L.), Castor oil leaf (*Ricinus communis* L.), Nerium (*Nerium oleander* L.), Champak (*Magnolia champaca* L.),Jack fruit waste (*Artocarpus heterophyllus* L.), Ficus leaves (*Opuntiaficus-indica* L.), Jamun leaves (*Jambulina* L.), Crotalaria leaves (*Crotalaria* L.),Honge leaves (*Pongamia pinnata* L.) and Mango Leaves (*Mangifera indica* L.).

Each of the substrate was individually inoculated with the test organisms which were identified as *Bacillus pumilus and Mesorhizobium sp.*, The DNS assay was carried out for estimation the degradation of cellulose and release of simple sugars (Gail Lorenz Miller, 1959) and Lignin oxidation assay, was carried out at an interval of 7 days to check for lignin degradation. Enzyme activity was calculated based on the oxidation of veratryl alcohol to veratryl aldehyde (Acharya *et al*,. 2008, NutawanYoswathana *et al*,. 2009). The results were documented individually for each organism and all the substrates.

3. Results and Discussion

The results recorded for isolation from different samples showed the bacteria in the range of 14 to 83 CFU/gm or ml for different samples. Total of 92 bacterial species were isolated from different samples which varied in their colony morphology and Gram's characters.

All the bacterial isolates were subjected to screening for the production of cellulases, hemicellulases and ligninases on pure substrates such as Carboxy Methyl Cellulose (CMC), Xylan and Lignin to check for their degradation. The test result for the degradation of Cellulose, Lignin and Hemicellulose showed that most of the organisms were positive for cellulose and hemicelluloses where as lignin degradation capacity was limited to very few isolates. Two bacterial isolates showed degradation for all the substrates and these were identified as *Bacillus pumilus* and *Mesorhizobium* sp.

These isolates were inoculated onto+ 18 different substrate and their enzymatic activity was determined. *Bacillus pumilus* exhibited maximum degradation of Cellulose in 8 substrates: Eucalyptus, Maize, Saw dust, Rice straw, Paper, Ragi straw, Maize leaves, Nerium within the 1st 5 weeks. *Bacillus pumilus* exhibited maximum oxidation of lignin in 14 substrates: Eucalyptus, Maize, Rice straw, Sugar cane, Ragi straw, Maize leaves, Teak big leaves, Castor oil leaf, Nerium, Champak, Ficus, Crotoliria, Hongge, Mango leaves within the 1st 3 weeks (Figure 1 and 2).

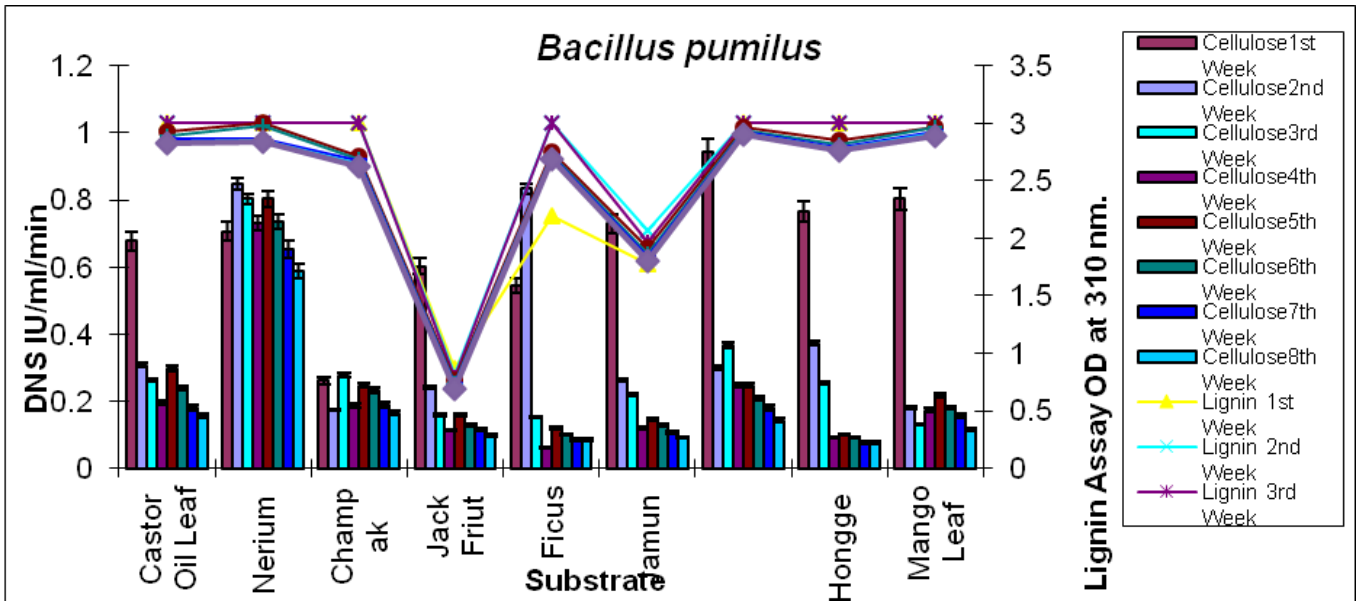

Figure 1: lignocellulase production by *Bacillus pumilus*

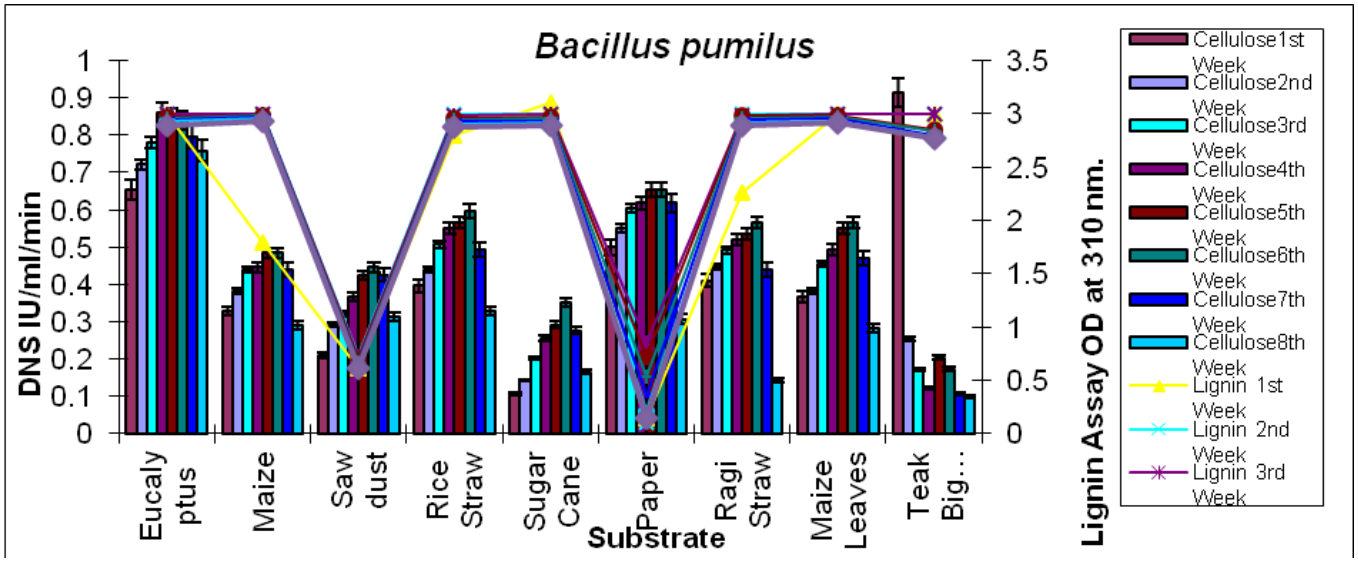

Figure 2: lignocellulase production by *Bacillus pumilus*

Mesorhizobium sp. exhibited maximum degradation of Cellulose in 5 substrates, they are: Eucalyptus, Rice straw, Paper, Ragi straw, Nerium, within the 1st 5 weeks. *Mesorhizobium sp.* exhibited maximum oxidation of lignin in 14 substrates, they are: Eucalyptus, Maize, Rice straw, Sugar cane, Maize leaves,Teak big leaves, Castor oil leaf, Nerium, Champak, Ficus, Jamun, Crotoliria, Hongge, Mango leaves within the 1st 3 weeks (Figure 3 and 4).

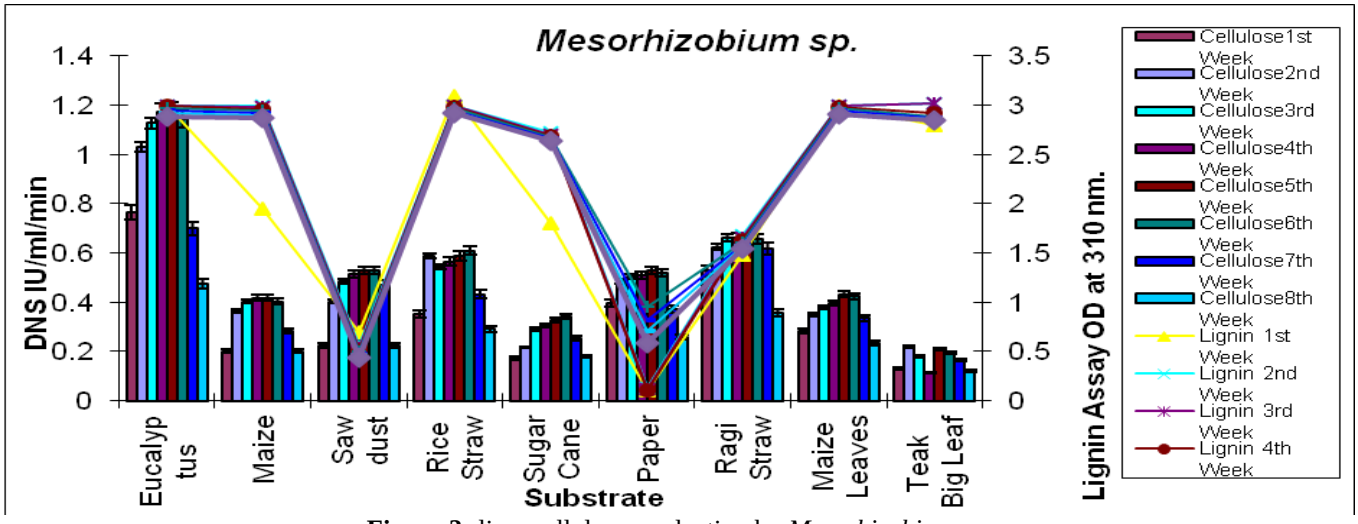

Figure 3: lignocellulase production by *Mesorhizobium sp.*

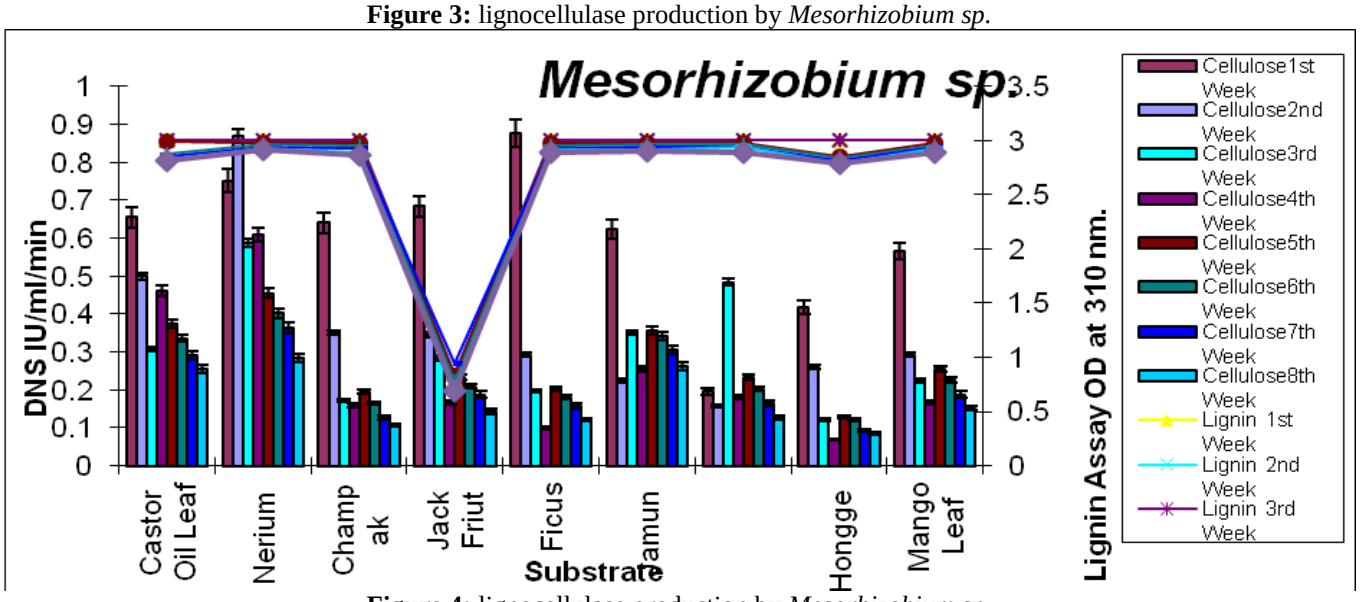

Figure 4: lignocellulase production by *Mesorhizobium sp.*

Similarly Brewer's Spent Grain (BSG) is a material that posses sugars polymerised into cellulose and hemicellulose. The fractionation process under adequate conditions of BSG may produce a liquor rich in xylose, a sugar that can be used as a carbon source for xylitol or ethanol production (Nigam et al., 2002 and Mussatto et al., 2004).

Lignocellulosic biomasses have been reduced to fermentable sugars utilisable by other isolates for ethanol production and thus proved to have a high energy value which is in comparison to statement of Scheper, (2007).

In the present study, bacterial isolates have broken down a complex polysaccharide with the enzymes produced by them on par with the known fungal isolate extensively studied *T.ressei (*Akin *et al*., 1995; Gold and Alic, 1993) and also the ability of bacteria to carry out efficient enzymatic hydrolysis is comparable to the observations of Rheinheimer (1980), where he observed that the matter can be broken down by many Bacteria. Thus, contributing to the recycling of nutrients, matter in the sea and thus maintain an equilibrium..

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