DEGRADATION OF PLASTICS BY FUNGI

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ABSTRACT:- Plastic accumulation is posing an ecological threat to the environment. It takes 1000 years for their degradation. The present study is focused on degradation of plastics by fungi. The fungal samples associated with plastic were collected from domestic and commercials sites. These fungi were isolated and cultured on PDA medium and were observed for degradation of plastics. The fungi used the plastics as a source of carbon and energy for their growth and degraded the plastics. The fungal organisms such as Aspergillus, Penicillium, Rhizopus, Colletotrichum, Fusarium, were observed as potent plastic degrading fungi. The fungi were studied for weight loss of the sterilized polyethylene strips at 2 months, 4 months and 8 month intervals. The reduction in the weight of the polyethylene strips were observed due to the degradation by fungi. Thus fungi can be used for ex-situ and in-situ bioremediation and can resolve one of the global and ecological issue of plastic accumulation.

KEYWORDS:- Plastics, Degradation, Fungi.

INTRODUCTION:- Plastics are most commonly used man made polymers. The composition of plastic is Carbon, Hydrogen, Silicon, Oxygen, Chloride, Nitrogen, etc. Plastics are polymers that consists of monomers linked together by chemical bonds. Plastics have become an integral part of contemporary life as they are widely used because of their durability and resistance to degradation. Each year about 100 million tons of plastics are produced worldwide. Huge amount of polythene accumulation is causing

MATERIALS AND METHODS: - The samples of polyethylene wrapped by food wastes, domestic household wastes and vegetable wastes were collected from domestic and commercial sites. The samples collection was done to screen for the potential polythene degrading fungi and to identify them. These fungi were grown on Potato Dextrose Media by following certain microbial techniques such as pour plate method, dilution technique method and scraping methods. The growth of fungi was observed and their identification was done using Standard Manuals of soil fungi by Gilman J. C (1959) and soil fungi by Manoharachary (1991). Low density unused (new) polyethylene sheets of 20 microns were purchased and cut into small pieces. These sheets were weighed and sterilized using 70% ethyl alcohol. The isolated fungi were grown on PDA media along with the Sterilized Polyethylene strips to observe the degradation and weight loss etc.

RESULTS AND DISCUSSION: - The fungal species such as Aspergillus, Penicillium, Rhizopus, Collectotrichum, Fusarium etc were identified from the collected samples. These fungal species were showing good plastic degrading property amongst which the most potential fungus was Aspergillus. The
Sterilized Polyethylene Strips were weighed and were inoculated with the isolated fungi in PDA medium. These polyethylene strips were removed, washed with sterilized water, their weight was measured after 2 months, 4 months and 8 months of growth period. The results clearly indicated the loss of weight and the halo regions in the polyethylene sheets were observed. As these fungi utilized the plastic material as a source of carbon and energy for their growth, the weight of plastics was reduced.

**CONCLUSION**:- The plastics takes about thousand years to decompose. The fungal organisms which were screened and used for the study utilized the polyethylene film as a source of carbon and formed a biofilm on the polyethylene strips. These fungal microbes utilized the plastic material and thus resulted in the reduction of weight in the plastic strips and ultimately caused the degradation of plastics. Hence fungal species can be used for cleaning up the plastic residues from the environment, thus solving the ecological issue which posed a serious threat to the environment.

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