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Isolation of Phenol Degrading Fungi from Cow dung and Poultry droppings

Anshu Priya*, Kumari Priya*, Amita Jha**
*B.Sc.III, Department of Industrial Microbiology, Patna Women's College
** Guest Faculty, Department of Industrial Microbiology, Patna Women's College

Various fungi in cow dung and poultry droppings are reported in literature(Smith et al 1972).These fungi have ability to use various sources to meet their requirement for carbon and energy. The present paper describes the isolation of fungi from cow dung and poultry droppings, which have the ability to utilize and degrade phenol as sole source of carbon and energy. The result suggested that cowdung & poultry droppings have microbes which utilize phenol as sole source of carbon & energy and thus can degrade them.

Key words : *Cow dung, poultry droppings, phenol degradation, and mycoflora.*

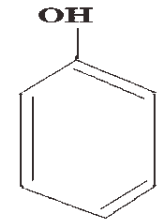
Introduction : Indians have a tradition of flooring their houses with cattle dung, which must have scientific bearing. Cow dung and poultry droppings are dwelling place for numerous microorganism including fungi. Some of these may have some bioremediatory action (Odgen and Adams, 1989). Bioremediation involves the use of microorganism to remove pollutants (Robert & Hennry,1976). For bioremediation to be considered as an applicable technology for the cleanup of specific pollutant, it is necessary to show that a specific chemical or chemical mixture is biodegradable and that process of bioremediation will not result in untoward ecological side effects.

Bioremediation can be applied to sites contaminated with a variety of chemical pollutants including oil and various other hydrocarbons.

To demonstrate that a bioremediation technology is potentially useful,it is important to document enhanced biodegradation of the pollutant under controlled conditions. This can not be accomplished *insitu* and thus must be accomplished in laboratory experiments. Laboratory experiments that closely model real environmental condition are most likely to produce relevant results. In many cases this involves using samples collected in the field contain indigenous microbial populations.

In situ bioremediation techniques for hydrocarbon contaminated surface system have been reviewed and evaluated in several reports (Vanlooke et al 1975; Raymond et al 1976;Brown et al 1985).

There are many fungi present in cow dung and poultry dropping. They degrade and utilize various sources to meet their need for carbon and energy (James & Walter ,1974). Phenol is one such source.(Amadi et al ,1993, Obire and Akinde, 2006, Walter et al ,1991).



Many species of fungi have the ability to degrade phenol and convert it into catechol.These fungi utilize phenol as soul source of carbon and thus derive their energy (Amadi and Ue-Bari,1992 Johnson etal,1994). Present study has been to designed to evaluate the role of various fungi isolated from cowdung and poultry droppings for degradation of Phenol.

Materials and Method :

Source of materials

Cow dung and poultry droppings used for study are aseptically collected from *khatal* and poultry farm respectively. The cow dung and poultry dropping collected fresh and, all microbiological analysis were carried out within 24 hours after the collection of samples.

Sample size and Sampling method

Potato dextrose agar (PDA) medium was used for isolation and enumeration of total heterotrophic fungi, having following composition.

Potato	–	200g;
Distilled water	–	500ml;
Glucose D	–	15g;
Agar No. 1	–	20g.

Tetracycline was added to prevent bacterial growth and permitted selective isolation of yeasts and moulds. The medium was allowed to cool to 45°C under aseptic condition, mixed thoroughly and then dispensed into sterile Petri dishes to set. Phenol agar medium was prepared according to the. mineral salts medium (MSM) composition. The composition of the medium was;

NaCl	–	10.0g;
$MgSO_4.7H_2O$	–	0.42g;
KCl	–	0.29g;
KH_2PO_4	–	0.83g;
Na_2HPO_4	–	1.25g;
$NaNO_3$	–	0.42g;
Agar	–	20g;
Distilled water	–	1 litre
pH	–	7.2

This medium was used for isolation, enumeration and preliminary identification of Phenol-utilizing fungi (phenol-degraders). The medium was prepared by the addition of 1% (v/v) phenol to sterile MSM, which has been cooled to 45 ^{0} C under aseptic condition. Tetracycline was added to prevent bacterial growth. The MSM and Phenol were then mixed thoroughly and dispensed into sterile Petri dishes to set. After incubation, the colonies that developed on the PDA plates were counted and recorded as counts of total viable saprophytic fungi. For the estimation and preliminary identification of phenol-utilizing fungi, phenol agar plates were inoculated with 0.1ml aliquots of 10^{-1} dilutions of the soil samples incubated at 28 ± 2°C for 7 days. Colonies which developed and showed growth of colonies and zones of clearance of phenol on the phenol-agar plates were counted as phenol-utilizing fungi.

Methods of data analysis :

Presumptive identification of fungal isolates:

Pure Fungal cultures were observed while still on plates and after wet mount in lacto-phenol on slides under the compound microscope. Observed characteristics were recorded and compared with the established identification.

Result and Discussion :

Colony characteristic and microscopic view of distinct colony were compared with the established identifying features of fungi, and they were tentatively identified (Table 1).

Table 1: Colony isolated on PDA plate from cow dung and poultry droppings as follows:

Sl. No.	Colony Number	Cow dung	Poultry dropping
01	I	*Alternaria*	*Aspergillus*
02	II	*Aspergillus*	*Mucor*
03	III	*Mucor*	*Fusarium*
04	IV	*Penicillium*	*Penicillium*

These fungi were identified as saprophytic fungus, since they are utilizing organic nutrients present in cow dung and poultry droppings.

Similarly colonies which appeared on MSM medium were also identified (Table 2).

Table 2: Colonies isolated on Phenol Agar Plate from cow dung and poultry droppings.

Sl. No.	Colony Number	Cow dung	Poultry dropping
01	I	*Penicillium*	*Fusarium*
02	II	*Aspergillus*	*Mucor*
03	III	—	*Aspergillus*
04	IV	—	*Penicillium*

These fungi were considered as phenol degraders, since they are utilizing PHENOL that is the only source of carbon present in phenol agar medium.

Fungus isolated from cowdung and poultry dropping on PDA are saprophytic fungi, present in one gram of inoculum . Fungus isolated on MSM plate from cowdung and poultry dropping was considered as phenol degrader fungi, since they are utilizing phenol as their only source of carbon and energy.

Poultry dropping supported growth of greater variety of fungi than cowdung which suggest that poultry dropping may, therefore, have more utilizable nutrient than cowdung .

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References :

1. *Bartha, R and Atlas, R.M. (2006). The Microbiology of Aquatic oil Spills. Advanced Applied. Microbiology, 22: 225-266.*

2. *Obire, O. (1995). Studies on the Biodegradation Potentials of Some Microorganisms Isolated From Water Systems, Botany 1: 81-90.*

3. *Obire, O. and Akinde, S.B. (2006). Comparative Study of the Efficiency of Cow dung and Poultry manure as Nutrient Alternative Sources in Bioremediation of Polluted Soil, Niger Delta Biologia 5(2): 82-91.*

4. *O.Obire, EC.Anyanwu., R.N.Okigbo. (2008). Journal of Agricultural Technology, V.4(2):81-89.*