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RESEARCH ARTICLE

A REVIEW ON BENEFICIAL EFFECTS OF COW DUNG

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ABSTRACT

Cow is worshiped as God in India and its products are having nutritional, medical and other important uses. The microbial consortium of Cow dung is used in bioremediation of metals, pesticides, pharmaceutical products, petrochemicals and biomedical waste. Cow dung is used in composting and used as fertilizer performs activities such as Sulphur oxidation and phosphate solubilisation. The metagenomics of cow dung is studied up to some extent. Cow dung slurry contains bacteria, fungi and actinomycetes namely *Faecal Streptococcus, Streptococcus, Pseudomonas Sp, Sarcina, Nocardia, Mucor Sp, Rhizopus Sp, Aspergillus, E.coli sp and Penicillium sp.* It is used as mosquito repellent.

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INTRODUCTION

Cow is worshipped as God in India. Because of its importance in nature in providing food like milk, curd, ghee like mother and excreta such as urine and cow dung which are having medical importance. Cow is termed as "Kamdhenu" as well as "Gaumata" (Sharma, 1981; Susruta Samhita,1885). The therapeutic nature of 5 products of cow are used in several treatments and so called as "Panchgavya" (Dhama*et al*., 2005b; Mathivanan *et al*., 2008).

Medicine: According to Panchgavya the products of cow have been found to improve the resistance power of humans and curing various human infections. The anti-oxidants in panchgavya prevent the free radicals and repair the damaged DNA (Dhama *et al.*, 2005a). Cowdung is known to have antiseptic and prophylactic properties (Dhama *et al*., 2005b). More than 70% of veterinary medicines contain cow dung (Thiele-Bruhn, 2003).

Bioremediation: The use of cowdung instead of chemicals not only helps the crop to grow healthy (Chauhan *et al*, 2006) but also due to the presence of various nutrients higher concentrations and microbial consortium, the bioremediation of the products is also rapid(Geetha *et al.*, 2008; Singh *et al.*, 2010). *Periconiella* Sp. of fungus isolated from fungus acts as degrader of biomedical waste (Pandey *et al.*, 2008). Cow dung vermicompost containing earth worm *E.foetida* have been found to reduce metals (Cr, Cu, Ni and Pb) in municipal sludge (Srivastava *et al.*, 2005). Now-a-days the use of pharmaceutical products, pesticides, and petrochemicals by man has been increasing. Their accumulation in nature is causing pollution to the environment due to the release of toxic gases and other products. They are harmful to the mankind because of potential toxicity, mutagenicity, carcinogenicity, and genotoxicity. Cow dung is used as an excellent bioremediation method by sprinkling the slurry on these products. Thus, utilizing cow dung as slurry or after composting in rural areas, is a cheap and effective measure to bio-remediate the harmful pollutants (Ank, 1995). *Periconiella* species of fungus isolated from cow dung was found to be an excellent degrader of biomedical waste. Fifty grams of biomedical waste, kept in the form of used bandages and cotton in culture media, were effectively and completely reduced by 50th day. It was found to be cheap, safe, and environment friendly method of biomedical waste disposal (Pandey *et al.*, 2008).

Slurry: When cow dung is mixed with cow urine it is termed as slurry. It contains crude fibre (cellulose with lignin), crude protein, cellulose, hemi cellulose, and minerals like nitrogen, potassium, traces of sulphur, iron, magnesium, calcium, cobalt, manganese and so on (Nene,1999). The slurry is diluted and sprinkled In front of rural and urban areas. It is used to degrade hospital waste and oil spillage naturally. Cow dung slurry contains bacteria, fungi and actinomycetes namely Faecal Streptococcus, *Streptococcus, Pseudomonas Sp, Sarcina,*

*Nocardia, MucorSp, RhizopusSp, Aspergillus, E.coli*sp and *Penicillium* sp (Geetha, 2008).

Fertilizer: Cowdung is the excretory waste of plant material with good consortium of beneficial bacteria and rich in minerals. Cow dung consists of fibrous material which helps to maintain porosity of soil. Cow dung when used as fertilizer performs activities such as Sulphur oxidation and phosphate solubilisation (Bharti Sharma, 2015). In a study of the microbial composition of cow dung, about 60 species of bacteria were observed. Among these bacteria of Bacillus sp, Corynebacterium sp, and lactobacillus species, fungi ofAspergillus and Trichoderma, about 100 species of protozoa and yeasts of Saccharomyces and Candida. Majority of bacteria are cellulose, hemicelluloses, and pectin fermenters. Cow dung comprises of undigested fibre, sloughed off intestinal epithelium, some excreted products derived from bile, intestinal bacteria, and mucus. The bile pigment biliverdin is mainly present in cow dung gives it green colour (Geetha, 2008).Cow dung with agricultural residue improves the soil nutrients, tilth, aeration and water holding capacity was tested. It showed that the nutrients are released slowly, steadily and activated soil microbial biomass (Belay, 2001). *Eiseniafetida* was observed as the most efficient and commonly used bacteria for vermicomposting to develop compost using cow dung i.e., dairy manure (Alwaneen, 2016). Studies on the use of cow dung microorganisms in promoting soil fertility to improve crop yield were done by Swain *et al.* (2012). In this study, thermo tolerant Bacillus subtilis strains have been recovered from cow dung which is having higher strength in phosphate solubilisation. These Bacillus strains also possessed antagonistic activities against plant pathogens along with production of growth regulators. When degraded or highly leached soil is treated with cow dung the fertility of soil was improved. Several combinations of cow dung and NPK were used and studied the improvements in sweet potato crop. In Southeastern Nigeria the farmers were suggested to use cow dung and NPK in ratio of 3 t ha^{-1} CD+100 kg ha^{-1} which was proved superior over other rates in improving soil properties, nutrient uptake, growth and yield of sweet potato. These efforts are considered as Best Management Practices which minimize the negative impacts and increase the crop productivity, economic profitability and environmental sustainability simultaneously (Stanley, 2010).

Effect of CaO_2 on cow dung rapid bio-drying technology was researched. When CaO_2 groups were added during composting, the rise in temperature faster was observed 4-6 days in advance to the thermophilic phase; at the end of composting, the CaO_2 composition and moisture content decreased significantly to below 30%. The addition of CaO_2 in fertilizer lessen the composting time, extend the thermophilic phase and provides sufficient oxygen meeting the growth needs of aerobic microorganisms. This kind of rapid bio-drying of dairy manure has a good effect and provided a new idea for the effective treatment of cow dung (Xiaotian, 2017).

Household: In India cow dung is used as purifier and used to disinfect homes. Cow dung is also used as repellent against mosquitoes, ants and flies (Srivatsava, 2010).

Metagenomics: The consortium have been analysed using conventional methods (Ozutsumi, 2005). But only 1% of the bacteria were able to culture because of lengthy procedures (Nocker, 2007). Instead of this the DNA may be isolated, cloned in the appropriate vector and the transformants may be screened. This process is called as metagenomics (Zeyaullah, 2009).According to Girija *et al.* (2012) a culture independent 16S rDNA was taken up for metagenomics. Total community DNA was extracted from fresh dung of Brown-Swiss breed. The bacterial 16S rRNA genes were subsequently amplified, cloned, sequenced and deposited in Gene Bank. The bacteria of phylums – Bacteroides, Fermicutes, Proteobacteria and *Verrucomicrobia* were studied in the percentage of 38.3%, 29.8%, 21.3% and 2% respectively. Bacteroides clones included the genera Bacteroids, *A.listipes* and *Paludibacter*, while *Clostridium*, *Rumincoccus, Anaerovorax* and *Bacillus* were predominant in Fermicutes. – α and β proteobacterial genera included *Acinetobacter*, *Pseudomonas*, *Rheiheimera*, *Stenotrophomonas* and *Rhodobacter*(Bharti Sharma, 2015).

Biogas: Cow dung is used for the production of biogas or gobar gas in India (Livestock Census, 2012). Addition of pig dung to cow dung in 60 and 40 ratio was found to have an enhanced effect in production of methane (Li, 2015). Some greenhouse gases emitted from organic wastes cause environmental pollution if remain untreated. So the organic waste may be used for the biogas production which is the effective way (Munda, 2012).

Cow dung as electrode: In a study, the cow dung was carbonized and current output was taken from the anode after treating at various temperatures from 400^0C to 1000^0C under nitrogen atmosphere. During this at 600^0C temperature the cow dung was possessed high conductivity. The maximum current output performance (11.74 ± 0.41 A m^{-2}) was obtained for cow dung treated at 800°C. So it is proved that the carbonized cow dung cold be used as an electrode material (Huajun Feng, 2018).

Iron ore mixture: The addition of carbon-bearing iron ore pellets to the cow dung containing mixture of cow dung, iron ore, anthracite, and bentonite was studied. The quality of green and dry pellet was evaluated based on FTIR analysis, and the mechanism of strength variation of the reduced pellets was investigated by analysing the phase composition and microstructure using XRD and SEM. In the process of reduction roasting, it was found that cow dung addition can promote aggregation of iron crystals and increase the density of the pellets, resulting in increased strength of the reduction roasted pellets, while excessive cow dung addition resulted in lower strength (Qing-min_Meng, 2017).

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