

Exploring Floral Waste into Bio-compost using Microbial Consortium from cow dung: A Review.

Exploración de desechos florales en bio-compost utilizando el consorcio microbiano de estiércol de vaca: una revisión.

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ABSTRACT

India being a cultural nation with pilgrimage and deities activities as well an arena of myriad social and cultural functional events, leads to floral waste generation as a natural inevitable outcome with a very slow degradation. A huge amounts of flower waste followed by temple offerings, released daily in the water bodies or as dumping off in soil. This leads to a severe environmental pollution and health hazards. Degraded floral waste residues serve to be a cheap & flexible source of choice for bio compost. Presence of a diverse group of microorganisms isolated from rich nutritional source as cow dung helps in an efficient degradation of highly complex organic components into simple stable end product, BioCompost Therefore in the present work, an attempt was made, to discuss on an efficient degradation process of floral waste by cow dung driven microbial isolates.

Key words: Floral waste, cow-dung, microbial consortium, metabolites, BioCompost.

RESUMEN

India es una nación cultural con actividades de peregrinaje y deidades, así como un escenario de innumerables eventos funcionales sociales y culturales, lo que lleva a la generación de desechos florales como un resultado natural inevitable con una

degradación muy lenta. Una gran cantidad de desechos de flores seguidos de ofrendas en el templo, se liberan diariamente en los cuerpos de agua o como vertidos en el suelo. Esto conduce a una grave contaminación ambiental y peligros para la salud. Los residuos de desechos florales degradados sirven para ser una fuente de elección barata y flexible para el compostaje biológico. La presencia de un grupo diverso de microorganismos aislados de fuentes nutritivas ricas como estiércol de vaca ayuda a una degradación eficiente de componentes orgánicos altamente complejos en un producto final estable simple, Bio-Compost. proceso de degradación de desechos florales por aislamientos microbianos impulsados por estiércol de vaca.

Palabras clave: Residuos florales, estiércol de vaca, consorcio microbiano, metabolitos, Bio-Compost.

INTRODUCTION

In India, the utilization of flowers during worshipping is a typical practice. These flowers are replaced each day with new flowers which prompts the age of loads of flower wastes regularly from temples, houses, and so forth. In India, around 80,00,000 tons of floral waste are dumped in waterways consistently (Gupta and Sapaliga, 2017, Barad and Upadhyay, 2016, Maity, 2016, Patil et al., 2018, Tiwari and Juneja, 2016, Makhania and Upadhyay, 2015, Mahindrakar, 2018) Degradation of flower waste is a moderate procedure when contrasted with kitchen waste degradation. Likewise it causes eel and worm formation at the site. Consequently there is a need of appropriate and eco-accommodating procedure for flower waste degradation. Expanding population normally increase the interest for agro items. Yield creation is commonly expanded by utilizing manures. Utilization of compound composts causes its biomagnifications in the evolved way of life. (Jadhav et al., 2013).

Cow dung can be characterized as the undigested build-up of expended food material being discharged by herbivorous bovine animal species. Being a blend of faeces and urine in the proportion of 3:1, it for the major part comprises of lignin, cellulose and hemicelluloses. It additionally contains 24 unique minerals like nitrogen, potassium, alongside follow measure of sulphur, iron, magnesium, copper, cobalt and manganese. The indigenous Indian cow additionally contains higher measure of calcium, phosphorus, zinc and copper than the cross-breed cow. Cow dung harbours a rich microbial diversity, containing various types of microorganisms In India, 69.9 %

population dwells in villages where cow is major cattle (The Hindu 2011), (Gupta et al., 2016). Cow dung was as of late demonstrated to be rich in hydro-carbonolastic living beings set up the relationship of lignin degrading creatures with degradation of natural poisons. As per them, such smaller scale life forms might be secluded from fecal materials is equipped for degrading a wide scope of contaminations (Adebusoye et al., 2015)

The composting is viewed as an aerobic, thermophilic, microorganism-mediated, solid state fermentation process through which distinctive natural materials are changed into more stable entities that are raw material of humic substances (Sánchez et al,2017) (Pergola et al.,2018). However, there are a several naturally occurring microorganisms that can change over natural waste into important assets, for example, plant supplements, and reduce the C:N proportion to help soil efficiency. These microorganisms are likewise essential to keep up supplement streams starting with one framework then onto the next and to limit natural imbalance (Pan et al., 2012).

FLORAL WASTE IN INDIA AND ITS UTILIZATION

Flowers come as waste from different sources like inns hotels, marriages, gardens, temples, dargah and different other cultural and religious ceremonies. In India, religion is a way of life. It is a natural component of the whole Indian convention. Individuals worship Gods and are acclimated with go to the temples offering flowers, fruits, coconut and sweets, etc. The greater part of the flowers, leaves of various plants, coconut shells, milk and curd are accumulated and afterward discarded only in water bodies (Singh and Singh, 2007).

Regular these flowers are offered by devotees in temples and are left unused and in this way gotten waste. India is a nation of celebrations and numerous events are commended round the year which in the long run prompts the age of solid waste. This extent of waste is commonly dismissed and requires due contemplations. As a result of our strict convictions many of us avoid throwing flowers and other things that are utilized in worships in the trash, and rather put them in the plastic packs and throw them straightforwardly in the water bodies, aside from this; it is likewise thrown close to holy trees with no reasonable method of removal. For example, Banaras, perhaps the holiest city of the nation, has no arrangement for the removal of the huge amounts

of waste that originates from its Man temples. Every day waste material 3.5-4 tones deserted in city of the temples (Mishra, 2013).



Fig 1: floral waste dumped in river; taken this from BBC news website.

Measure of flower wastes change from city to city. A few urban communities in India are extraordinarily known for temples and pilgrimages. In such cases the flower waste content in the waste is expanded, and over ten times during exceptional events like occasions and so on, Some of the significant flowers offered in temples are: Jasmine, Marigold, Chrysanthemum, Hibiscus, Rose and so on, these flowers are either disposed of as waste or given for enhancement and to devotees, however it be they are at long last discarded and discover their way into condition except if took care of something else (Swapnavahini et al., 2010).

Degradation of floral waste is an extremely moderate procedure when contrasted with kitchen waste degradation (Jadhav et al., 2013). In this way there is a requirement for appropriate and eco-friendly process for flower waste treatment. The executives and usage of flower waste was completed in certain studies. One such model is the Kashi Vishwanath temple which draws greatest devotees all round the year, particularly in the long stretch of Shravan. It has its own framework for removal of several kilograms of waste coming about because of offerings by devotees; the floral waste created in the temple is changed over into fertilizer (Times of India, Mishra, 2013).

To keep away from sick impacts brought about by removal of these offerings they can be utilized to make a few assets. Like consuming of incense stick produce fumes which contain Particulate Matter (PM), gas items and numerous natural compounds additionally, in this manner flower petals got from temples can be used to make herbal incense sticks. Flowers like genda are utilized to make incense sticks,

while roses are changed over to rose water. Other than incense and rosewater, the Flowers can also be fused into herbal items, for example, herbal hues, regular colors and so forth. (The Hindu, Jan., 2013). Another situation where floral waste administration has yielded great settlements is that of Ajmer Sharif Dargah of Khwaja Moinuddin Chishti where almost 15 to 18 Quintals of. Flowers, offered every day were utilized to be dumped in a well. Presently, the roses are reused, yet in addition produce work for nearby ladies. With specialized help from Central Institute of Medicinal and Aromatic Plant (CIMAP), Lucknow, the Dargah Committee has set up a rose water refining plant at the edges of Ajmer (Indian Express, May, 2010).

BIO-COMPOSTING

Composting is "the controlled aerobic consuming biological decay of organic matter into steady, humus-like item called compost. It is basically a similar procedure as normal decay aside from that it is upgraded and quickened by blending organic wastes in with different fixings to advance microbial growth" (USDA, 2000) . Hence, such waste administration framework transforms a loss into an asset by making a reused item comprised of settled organic matter, carbon rich and liberated from most pathogens and weed seeds (Alberta, 2005). Yield build-ups created under greenhouse/tunnel, manure from cattle farms ranches, agro- industrial preparing deposits, just as any unsold agricultural products, can be phenomenal frameworks to be composted. For the most part, those deposits are effectively degradable and they have healthful and preparing properties; in this way, less-compressible material with gainful organizing capacity, for example, pruning build-ups, wood chips, straw (called bulking materials), ought to consistently be included for a right composting procedure. Those materials can offer porosity to the mass and guarantee the ideal oxygen entry for high-impact microorganism's action. The compost can be effectively applied to the soil, with changing and treating capacity, to recover degraded soils or keep up/increment soil fruitfulness. To sequester carbon into the soil in this manner lessening an Earth-wide temperature boost; to decrease creation expenses and negative effects of farming exercises by restricting contributions of composts, pesticides, and fuel. Compost, as balanced out organic matter, can be high-mindedly utilized for the recovery of degraded soils and their ripeness re-establishing, carbon sequestration in the soil and the decrease in the utilization of chemical inputs (composts, pesticides, fuel) bringing about the lessening of creation expenses and negative ecological effects. Also, compost can be effectively utilized in other gainful

(nursery) and scene natural interest exercises (green territories, recuperation of waste dumps, cultivating, and so on.).

Since composting is for the most part a microbial procedure, information on the different microbial groups and their role during the process of bio-oxidation is necessary. Composting the soil goes through a few phases, every one of which is described by the movement of various microbial groups. Transformation into fertilizer of the biodegradable organic portion of solid urban waste is one of the most approved strategies for reusing. It is a procedure with low vitality utilization and licenses the removal of the organic part of the solid urban waste and slime which together speak to quantitatively the best segment of deny. Composting, if accurately took care of will give a cleanly protected, agriculturally useful product. Modern techniques have been created which produce manure in a brief timeframe that is perfect with farming use. Specifically, information on the microbiological parts of composting has allowed the advancement of the considerable number of elements which impact the proces. (Bertoldi et al., 1983).

Compost is the after-effect of an oversaw deterioration process in which progressions of vigorous smaller scale creatures separate and change organic material into a scope of progressively complex organic substances, a significant number of which are inexactly alluded to as humus. (Paulin and Malleny, 2008).

MICROBIAL FLORA OF COW DUNG

As indicated by Girija et al. (2013) the diversity of microorganisms present in cow dung through a culture-free, 16S rDNA sequencing approach. The transcendent phyla identified in the examination were Bacteroidetes, Firmicutes and Proteobacteria. Individuals from these phyla have been accounted for to be productive degraders of complex organic matter like cellulose, lignin, chitin, xylan, and so on. Henceforth, discoveries of the current examination legitimize the utilization of cow dung in composting. This examination additionally distinguished *Acinetobacter*, *Bacillus*, *Stenotrophomona* and *Pseudomonas* species, all of which have just been accounted for as IAA and siderophore makers. Numerous *Acinetobacter* and *Pseudomonas* species have been accounted for to have nitrogen fixing and phosphate solubilizing exercises, along these lines conferring plant development advancing movement of cow dung, as saw by farmers.

The capacity to isolate high quantities of certain unrefined petroleum degrading microorganisms from the cow dung is characteristic that those microorganisms are the most dynamic degraders in that condition and can be utilized in the bioremediation of oil defiled destinations. Consequently, these microbial isolates from cow dung can be applied independently or as a consortium; seeding through bio augmentation for the improvement of degradation of raw petroleum when created and gathered in huge number as microbial biomass (Ikuesan et al., 2015)

The utilization of basic and effectively accessible waste, cow dung harbor a scope of microorganisms that demonstrate an extraordinary potential to degrade benzene. This microorganism in disconnection or as a consortium use and increase in nearness of high benzene focuses. Our research facility level bioremediation system has effectively given a proof of idea that the consortium produced can be additionally utilized at modern scale to decrease the weight of harmful benzene from the earth and check its wellbeing hazard (Godambe and Fulekar, 2016).

Cow dung has a wide assortment of microorganisms shifting in singular properties. Abuse of cow dung microbial flora can contribute altogether in practical horticulture and vitality prerequisites. It is one of the bio resources of this world which is accessible for huge scope and still not completely used. The comprehension of the systems empowering cow dung organisms to degrade hydrocarbons can advance bioremediation of natural contaminations. With late advances in logical examination and methods for complete genome successions, the qualities liable for bioremediation can be distinguished. Another energizing zone of exploration for future examinations is creating microbial catalysts and antimicrobials. The creation of proteins by microorganisms from this modest bio resource can discover wide applications in different fields, for example, agribusiness, science and biotechnology.(Gupta et al. ,2016)

Cow dung can be a very good source for the isolation of Cellulase producing bacteria. Cellulases purified here can be used for all its applications (Khan et al, 2011).Study shows that isolated bacterial strains can be utilized to forestall ailments brought about by pathogenic Strains. Thus, Cow dung fills in as a purifier of all losses in the nature, is a rich wellspring of microbial flora Which can be utilized as probiotics, live microbial food supplements altering the intestinal microbiota. Therefore, the concentrated endeavours must be started to recognize and save all the indigenous types of bovines for near substance, microbiological and immunological investigation of

milk, pee and compost with special reference to their horticultural, therapeutic and dietary centrality (Sharma and Singh, 2015).

Table1.Totalmicrobialcharacteristicsofcowdung.

1	Total Viable count/g	6.5x10 ¹⁰
2	Total coliform count/g	1.89x10 ⁹
3	Total Yeast count and mold count/g	7.2x10 ⁴
4	<i>Pseudomonas</i> count/g	5.9x10 ⁴
5	Actinomycetes count/g	8.3x10 ⁵
6	<i>Esherichia coli</i> count/g	2.36x10 ⁴
7	Anaerobic bacterial count	<30
8	Thermophilic bacterial count	7.9x10 ²
9	Anaerobic spore count	Nil
10	Thermophilic spore count	Nil
11	Anaerobic thermophilic spore count	Nil
12	<i>Salmonella</i> /25g	Absent
13	<i>Staphylococcus aureus</i> count/25g	Absent
14	<i>Shigella</i> sp.	Absent
15	Fecal Streptococcus sp	Present
16	<i>Flavobacterium</i> sp	Absent
17	<i>Alcaligenes</i> sp.	Present
18	<i>Bacillus</i> sp.	Present
19	<i>B.stearothermophilus</i> and <i>B.cereus</i>	Present
20	<i>Cellulomonas</i> sp.	Present
21	<i>Streptococcus</i> sp.	Present
22	<i>Sarcina</i> sp.	Present
23	<i>Serratia</i> sp.	Present
24	<i>Nocardia</i> sp.	Present
25	<i>Mucor</i> sp.	Present
26	<i>Rhizopus stolonifer</i>	Present
27	<i>Aspergillus</i> sp.	Present
28	<i>Penicillium</i> sp.	Present

(Take this table content from Boricha and Fulekar, 2009)

Cow dung based biodynamic arrangements show that they are ruled by *Bacillus spp.* This is another report of the event of *L. xylanilyticus* and *B. licheniformis* in biodynamic arrangements. The isolated bacterial strains showed plant development advancing characteristics like IAA creation, Phosphate solubilization, and threat to *R. bataticola* and improved the development of maize plants. The outcomes give a premise to understanding the gainful impacts of biodynamic arrangements and for conveying the strains in modern creation of biofertilizer and bio-control operators. (Radha and Rao, 2014)

Teo and Teoh, (2011) asses, Five distinct morphologically and physiologically isolates were isolated from cow dung at Kampar, Perak, Malaysia and refined on Nutrient agar (NA) plates. Morphological investigations including infinitesimal assessment, Gram-staining and endospore staining were performed. Isolates K1 and K5 were Gram-negative, while disconnects K2, K3 and K4 were Gram-positive. Isolates K2 and K4 had the option to shape endospore. Susceptibilities of five disengages to 17 unique kinds of anti-microbials were assessed utilizing the Kirby-Bauer examine. Every individual detach was impervious to at any rate 35% of the anti-microbials tested. Antibacterial exercises against 11 kinds of test creatures were assessed. Seclude K4 produced antibacterial operator which restrained the development of *Escherichia coli*. Enzymatic test for the nearness of 22 sorts of compounds were screened. All secludes delivered protease, lipase and esterase lipase.

Adegunloye et al, (2007) finished up that the creation of top notch dull earthy colored compost can be improved by microorganisms, temperature, air circulation, dampness substance and concoction organization of the organic waste materials. The cow dung encouraged the early development of the composts and furthermore added to the healthful substance of the compost. The diverse organic matter utilized in the compost procedure were completely used and changed over to supplement rich compost, consequently making fertilizing the soil an incredible waste reusing process. As a rule, the creation and utilization of compost assists with expanding soil supplements and to improve a few properties of the soil such as pH, surface, soil aggregation and chemical composition of the soil.

With this review article we can said that, floral waste is considered to be as one of the important and flexible, cheap, regional raw material choice for biocomposting is a significant attribute on which a detail insight can lead us through this article to a major conclusion. The utilization of floral waste is an important source for isolation of

significant microbes for efficient floral waste degradation and utilization of the same in bio compost preparation employing cow dung. The process overview can be easily done with the help of such consolidated information.

As conclusion, with studying reference papers we concluded that degradation of floral waste is a very slow process but by applying cow dung degradation process will enhance because cow dung has a microbial diversity in which some micro organism are capable of producing enzymes are capable to degrade organic waste and convert it into a stable product that means microbial flora of cow dung are capable to degrade floral waste and convert into a bio-compost which is very useful for agriculture purpose also enhance soil fertility and helps in organic farming. Overall it is multipurpose study in which pollutant like floral waste will utilize by using microbial consortium of cow dung convert it into bio-compost.

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