References

Adams, G. O., Tawari-Fufeyin, P., & Ehinomen, I. (2014). Bioremediation of Soils from Automobile Mechanic Workshops Using Cow Dung. *Journal of Applied & Environmental Microbiology*, *2*(4), 128–134. https://doi.org/10.12691/jaem-2-4-6

Adebusoye, S. A., Okpalanozie, O., & Nweke, N. C. (2015). Isolation and characterization of bacterial strains with pyrene metabolic functions from cow dung and Terminalia catappa phylloplane. *Biocatalysis and Agricultural Biotechnology*, *4*(4), 778–783. https://doi.org/10.1016/J.BCAB.2015.08.015

Adegunloye, D., Doyeni, M., Adegunloye, D. v, Adetuyi, F. C., Akinyosoye, F. A., & Doyeni, M. O. (2007). Microbial Analysis of Compost Using Cowdung as Booster Isolation Characterisation and control of Mycotoxigenic Fungi on Deteriorating Pennisetum glaucum View project Hyperlipidemia View project Microbial Analysis of Compost Using Cowdung as Booster. *Pakistan Journal of Nutrition*, *6*(5), 506–510. https://doi.org/10.3923/pjn.2007.506.510

Adeleke, F., Esther, B., & Clement, F. (2015). Cow dung as inoculum carrier for the degradation of crude oil. In *Sky Journal of Microbiology Research* (Vol. 3, Issue 4). http://www.skyjournals.org/SJMR

Adhikari, B. K., Barrington, S., Martinez, J., & King, S. (2009). Effectiveness of three bulking agents for food waste composting. *Waste Management*, *29*(1), 197–203. https://doi.org/10.1016/J.WASMAN.2008.04.001

Alam Khan, J., Ranjan, R. K., Rathod, V., & Gautam, P. (2011). Deciphering Cow Dung for Cellulase Producing Bacteria. *European Journal of Experimental Biology*, *1*(1), 139–147. www.pelagiaresearchlibrary.com

Ayoola, O. T., & Makinde, E. A. (2008). Performance of green maize and soil nutrient changes with fortified cow dung. *African Journal of Plant Science*, *2*(3), 19–022. http://www.academicjournals.org/AJPS

Barad, G., & Upadhyay, A. (2016). Degradation of Flower Wastes: A Review. *IJSRD-International Journal for Scientific Research & Development*|, *4*, 2321–0613. www.ijsrd.com

Barot, N. S., & Bagla, H. K. (2011). Biosorption of radiotoxic 90Sr by green adsorbent: dry cow dung powder. *Journal of Radioanalytical and Nuclear Chemistry*, *294*(1), 81–86. https://doi.org/10.1007/S10967-011-1539-3

Bedada, F. B., Chan, S. S. K., Metzger, S. K., Zhang, L., Zhang, J., Garry, D. J., Kamp, T. J., Kyba, M., & Metzger, J. M. (2014). Acquisition of a Quantitative, Stoichiometrically Conserved Ratiometric Marker of Maturation Status in Stem Cell-Derived Cardiac Myocytes. *Stem Cell Reports*, *3*(4), 594–605. https://doi.org/10.1016/J.STEMCR.2014.07.012

Bélanger, G., Rochette, P., Chantigny, M., Ziadi, N., Angers, D., Charbonneau, É., Pellerin, D., & Liang, C. (2015). Disponibilité de l'azote issu des excréments des vaches pour les graminées fourragères dans l'est du Canada. *Canadian Journal of Plant Science*, *95*(1), 55–65. https://doi.org/10.4141/CJPS-2014-039/ASSET/IMAGES/CJPS-2014-039TAB8.GIF

Bernal, M. P., Alburquerque, J. A., & Moral, R. (2009). Composting of animal manures and chemical criteria for compost maturity assessment. A review. *Bioresource Technology*, *100*(22), 5444–5453. https://doi.org/10.1016/J.BIORTECH.2008.11.027

Boricha, H., & Fulekar, M. H. (2009). Pseudomonas plecoglossicida as a novel organism for the bioremediation of cypermethrin. *Biology and Medicine*, *1*(4), 1–10.

DEBERTOLDI, M., VALLINI, G., & PERA, A. (1983). The biology of composting: A review. *Waste Management & Research*, *1*(2), 157–176. https://doi.org/10.1016/0734-242X(83)90055-1

Dhingani, A., Patel, J., Garala, K., Raval, M., & Dharamsi, A. (2014). Quality by Design Approach for Development of W/O Type Microemulsion-Based Transdermal Systems for Atenolol. *Journal of Dispersion Science and Technology*, *35*(5), 619–640. https://doi.org/10.1080/01932691.2013.802242

Dipty, S., & M.H., F. (2007). Bioremediation of phenol using microbial consortium in bioreactor. *Innovative Romanian Food Biotechnology*, *1*(1), 30–35. https://www.gup.ugal.ro/ugaljournals/index.php/IFRB/article/view/3288

Dowd, S. E., Callaway, T. R., Wolcott, R. D., Sun, Y., McKeehan, T., Hagevoort, R. G., & Edrington, T. S. (2008). Evaluation of the bacterial diversity in the feces of cattle using 16S rDNA bacterial tag-encoded FLX amplicon pyrosequencing (bTEFAP). *BMC Microbiology*, *8*(1), 1–8. https://doi.org/10.1186/1471-2180-8-125/TABLES/2

Effectivenessofcowdungandmineralfertilizer. (n.d.).

Eroa, M. G. (2015). Production and Characterization of Organic Fertilizer from Tubang-Bakod (Jatrophacurcas) Seed Cake and Chicken Manure. *Asia Pacific Journal of Multidisciplinary Research*, *3*(4).

Ewusi-Mensah, N., Logah, V., & Akrasi, E. J. (2014). Impact of Different Systems of Manure Management on the Quality of Cow Dung. *Http://Dx.Doi.Org/10.1080/00103624.2014.967854*, *46*(2), 137–147. https://doi.org/10.1080/00103624.2014.967854

Fulekar, M. H., & Geetha, M. (2008). Bioremediation of Chlorpyrifos by Pseudomonas aeruginosa using scale up technique. *Journal of Applied Biosciences*, *12*, 657–660. www.biosciences.elewa.org

Garala, K. C., Patel, J. M., Dhingani, A. P., & Dharamsi, A. T. (2013a). Preparation and evaluation of agglomerated crystals by crystallo-co- agglomeration: An integrated approach of principal component analysis and Box-Behnken experimental design. *International Journal of Pharmaceutics*, *452*(1–2), 135–156. https://doi.org/10.1016/j.ijpharm.2013.04.073

Garala, K. C., Patel, J. M., Dhingani, A. P., & Dharamsi, A. T. (2013b). Quality by design (QbD) approach for developing agglomerates containing racecadotril and loperamide hydrochloride by crystallo-co-agglomeration. *Powder Technology*, *247*, 128–146. https://doi.org/10.1016/j.powtec.2013.07.011

Garala, K. C., & Shah, P. H. (2010). Influence of crosslinking agent on the release of drug from the matrix transdermal patches of HPMC/Eudragit RL 100 polymer blends. *Journal of Macromolecular Science, Part A: Pure and Applied Chemistry*, *47*(3), 273–281. https://doi.org/10.1080/10601320903527111

Garala, K., Patel, J., Patel, A., & Dharamsi, A. (2011). Enhanced encapsulation of metoprolol tartrate with carbon nanotubes as adsorbent. *Applied Nanoscience (Switzerland)*, *1*(4), 219–230. https://doi.org/10.1007/s13204-011-0030-3

Garg, V. K., & Kaushik, P. (2005). Vermistabilization of textile mill sludge spiked with poultry droppings by an epigeic earthworm Eisenia foetida. *Bioresource Technology*, *96*(9), 1063–1071. https://doi.org/10.1016/J.BIORTECH.2004.09.003

Gentile, R., Vanlauwe, B., Chivenge, P., & Six, J. (2011). Trade-offs between the short- and long-term effects of residue quality on soil C and N dynamics. *Plant and Soil*, *338*(1), 159–169. https://doi.org/10.1007/S11104-010-0360-Z/FIGURES/5

Girija, D., Deepa, K., Xavier, F., Antony, I., & Shidhi, P. R. (2013). Analysis of cow dung microbiota-A metagenomic approach. *Indian Journal of Biotechnology*, *12*, 372–378.

Godambe, T., & Fulekar, M. H. (n.d.). Cow dung Bacteria offer an Effective Bioremediation for Hydrocarbon-Benzene. *International Journal of Biotech Trends and Technology*, *6*. Retrieved December 22, 2022, from http://www.ijbttjournal.org

Gorasiya, T., & Faldu, N. (2024). Exploring Floral Waste into Bio-compost using Microbial Consortium from cow dung: A Review. *Sustainability, Agri, Food and Environmental Research*, *12*(X), 2023. https://doi.org/10.7770/SAFER-V12N1-ART2600

Gupta, K. K., Aneja, K. R., & Rana, D. (2016). Current status of cow dung as a bioresource for sustainable development. *Bioresources and Bioprocessing*, *3*(1), 1–11. https://doi.org/10.1186/S40643-016-0105-9/METRICS

Gupta, V., & Sapaliga, H. (2017). Application of Household Generated Floral Wastes (Tagetes Spp.) as Biofertilizer for the Tulsi (Ocimum Tenuiflorum) Plant. *IJSRD-International Journal for Scientific Research & Development|*, *5*, 2321–0613. www.ijsrd.com

Haritash, A. K., & Kaushik, C. P. (2009). Biodegradation aspects of Polycyclic Aromatic Hydrocarbons (PAHs): A review. *Journal of Hazardous Materials*, *169*(1–3), 1–15. https://doi.org/10.1016/J.JHAZMAT.2009.03.137

Hassoon Ali, A., Abdul Razaq Nasir, Z., Swadi Tlaiaa, Y., & Dhamin Khishala, A. (2018). Production of high efficient compost from algae and organic fraction solid waste mixture. *Journal of Engineering and Sustainable Development*, *22*(2). https://doi.org/10.31272/jeasd.2018.2.82

International Journal of Advances in Pharmacy, Biology and Chemistry Research Article. (n.d.). www.ijapbc.com

Jain, N. (2016). Waste Management of Temple Floral offerings by Vermicomposting and its effect on Soil and Plant Growth. *International Journal of Environmental & Agriculture Research (IJOEAR) ISSN*, *2*(7).

Jina Devi, H., C Swamy, N. v, & Nagendra, H. R. (2004). Effect of Agnihotra on the germination of rice seeds. *Indian Journal of Traditional Knowledge*, *3*(3), 231–239.

Kala, D. R., Rosenani, A. B., Fauziah, C. I., & Thohirah, L. A. (n.d.). Composting Oil Palm Wastes and Sewage Sludge For Use In Potting Media Of Ornamental Plants. *Malaysian Journal of Soil Science*, *13*, 77–91.

Lu, H., Wang, X., Zhang, K., Xu, Y., Zhou, L., & Li, G. (2014). Identification and nematicidal activity of bacteria isolated from cow dung. *Annals of Microbiology*, *64*(1), 407–411. https://doi.org/10.1007/S13213-013-0660-7/METRICS

Mahindrakar, A. (2018). Floral Waste Utilization-A Review. *Mahindrakar Int. J. Pure App. Biosci*, *6*(2), 325–329. https://doi.org/10.18782/2320-7051.5357

Mahyudin, R. P., Firmansyah, M., & Fatimah, M. R. (2018). The comparison of organic waste compost quality between aerated static pile and open windrow method in Cahaya kencana landfill south Kalimantan Indonesia. *Env. Sci*, *5*(1), 5–11. http://www.innspub.net

Maiti, S. K. (n.d.). *Handbook of Methods in Environmental Studies Vol. 1: Water and Wastewater Analysis*.

Maity, P. K. (n.d.). *Impact of Waste Flower on Environment*. Retrieved December 22, 2022, from www.ijraset.com

Makhania, M., & Upadhyay, A. (2015). *Study of Flower Waste Composting to Generate Organic Nutrients*.

Masure, P. S., & Patil, B. M. (n.d.). *Conceive of Waste Flowers*. Retrieved December 22, 2022, from www.ijert.org

Mohapatra, D., Mishra, D., Chaudhury, G. R., & Das, R. P. (2008). Removal of Arsenic from Arsenic Rich Sludge by Volatilization Using Anaerobic Microorganisms Treated with Cow Dung. *Http://Dx.Doi.Org/10.1080/15320380802007069*, *17*(3), 301–311. https://doi.org/10.1080/15320380802007069

Mulay, Y., Owal, S., Chougule, P., & Pandit, A. (n.d.). Composting of floral waste by using indigenously isolated microbial consortium: An approach towards the Environment sustainability and waste management. *International Journal of Environmental & Agriculture Research*.

Nair, A. (n.d.). *Extraction of natural dye from waste flowers of Aster (Aster chinensis) and studying its potential application as pH indicator Journal of Innovations in Pharmaceutical and*

Nanomaterial based surfaces for virus disinfection View project Improvement of aromatic and Medicinal plants View project. Retrieved December 22, 2022, from www.jipbs.com

Namrata, K., Basarkar, P. W., Babalad, H. B., & Sreenivasa, M. N. (2012). Yield, yield attributes and economics of soybean as influenced by homa organic farming practices. *Karnataka Journal of Agricultural Sciences*, *25*(2), 270–272.

Orji, F. A., Ibiene, A. A., & Dike, E. N. (2012). Laboratory scale bioremediation of petroleum hydrocarbon-polluted mangrove swamps in the Niger Delta using cow dung Bioremediation of bonny light crude oil polluted soil using yeast isolates View project Enzymes technology View project Laboratory scale bioremediation of petroleum hydrocarbon-polluted mangrove swamps in the Niger Delta using cow dung. *Malaysian Journal of Microbiology*, *8*(4), 219–228. https://www.researchgate.net/publication/260287709

Palm, C. A., Myers, R. J. K., & Nandwa, S. M. (2015). Combined Use of Organic and Inorganic Nutrient Sources for Soil Fertility Maintenance and Replenishment. *Replenishing Soil Fertility in Africa*, 193–217. https://doi.org/10.2136/SSSASPECPUB51.C8

Pandey, A., & Gundevia, H. S. (2008). Role of the fungus--Periconiella sp. in destruction of biomedical waste. *Journal of Environmental Science & Engineering*, *50*(3), 239–240. https://europepmc.org/article/med/19552080

Patel, J., Dhingani, A., Garala, K., Raval, M., & Sheth, N. (2014a). Design and development of solid nanoparticulate dosage forms of telmisartan for bioavailability enhancement by integration of experimental design and principal component analysis. *Powder Technology*, *258*, 331–343. https://doi.org/10.1016/j.powtec.2014.03.001

Patel, J., Dhingani, A., Garala, K., Raval, M., & Sheth, N. (2014b). Quality by design approach for oral bioavailability enhancement of Irbesartan by self-nanoemulsifying tablets. *Drug Delivery*, *21*(6), 412–435. https://doi.org/10.3109/10717544.2013.853709

Paulin, B., & O'Malley, P. (2008). Compost production and use in horticulture. *Bulletins 4000 -*. https://library.dpird.wa.gov.au/bulletins/193

Peterson, J., Macdonell, M., Haroun, L., Monette, F., Operations, R., Douglas, O. R., Operations, C., & Taboas, O. A. (2007). *Radiological and Chemical Fact Sheets to Support Health Risk Analyses for Contaminated Areas*.

Pindi, P. K. (2012). Liquid Microbial Consortium- A Potential Tool for Sustainable Soil Health. *Journal of Biofertilizers & Biopesticides*, *03*(04). https://doi.org/10.4172/2155-6202.1000124

R, J. A., P, C. M., & G, S. H. (n.d.). *Flower Waste Degradation Using Microbial Consortium*. *3*(5), 1–04. Retrieved December 22, 2022, from www.iosrjournals.org

Radha, T. K., & Rao, D. L. N. (2014). Plant Growth Promoting Bacteria from Cow Dung Based Biodynamic Preparations. *Indian Journal of Microbiology*, *54*(4), 413–418. https://doi.org/10.1007/S12088-014-0468-6/METRICS

Randhawa, G. K., & Singh Kullar, J. (2011). Bioremediation of Pharmaceuticals, Pesticides, and Petrochemicals with Gomeya/Cow Dung. *International Scholarly Research Network ISRN Pharmacology*, *2011*. https://doi.org/10.5402/2011/362459

Raval, M. K., Garala, K. C., Patel, J. M., Parikh, R. K., & Sheth, N. R. (2021). Functionality improvement of Chlorzoxazone by crystallo-co-agglomeration using multivariate analysis approach. *Particulate Science and Technology*, *39*(6), 689–711. https://doi.org/10.1080/02726351.2020.1799126

Rupela, O. P., Gopalakrishnan, S., Krajewski, M., & Sriveni, M. (2003). A novel method for the identification and enumeration of microorganisms with potential for suppressing fungal plant pathogens. *Biology and Fertility of Soils*, *39*(2), 131–134. https://doi.org/10.1007/S00374-003-0680-8/METRICS

Sadhu, S., Ghosh, P. K., Aditya, G., & Maiti, T. K. (2014). Optimization and strain improvement by mutation for enhanced cellulase production by Bacillus sp. (MTCC10046) isolated from cow dung. *Journal of King Saud University - Science*, *26*(4), 323–332. https://doi.org/10.1016/J.JKSUS.2014.06.001

Sánchez, Ó. J., Ospina, D. A., & Montoya, S. (2017). Compost supplementation with nutrients and microorganisms in composting process. *Waste Management*, *69*, 136–153. https://doi.org/10.1016/J.WASMAN.2017.08.012

Saranraj P. (2012). *Vermicomposting and its importance in improvement of soil nutrients and agricultural crops Antibacterial Activity of Natural and Commercial Honey-A Comparative Study View project COMMERCIAL PRODUCTION AND APPLICATION OF BACTERIAL ALKALINE PROTEASE: A REVIEW View project*. https://www.researchgate.net/publication/259495486

Sarkar, S., Pal, S., & Chanda, S. (2016). Optimization of a Vegetable Waste Composting Process with a Significant Thermophilic Phase. *Procedia Environmental Sciences*, *35*, 435–440. https://doi.org/10.1016/J.PROENV.2016.07.026

Singh, P., Borthakur, A., Singh, R., Awasthi, Sh., Pal, D. B., Srivastava, P., Tiwary, D., & Mishra, P. K. (2017). Utilization of temple floral waste for extraction of valuable products: A close loop approach towards environmental sustainability and waste management. *Pollution*, *3*(1), 39–45. https://doi.org/10.22059/POLL.2017.59570

Swain, M. R., Kar, S., Padmaja, G., & Ray, R. C. (2006). Partial Characterization and Optimization of Production of Extracellular "-amylase from Bacillus subtilis Isolated from Culturable Cow Dung Microflora. In *Polish Journal of Microbiology* (Vol. 55). http://resources.ciheam.org/om/pdf/c54/01600010.pdf

Swain, M. R., Laxminarayana, K., & Ray, R. C. (2012). Phosphorus Solubilization by Thermotolerant Bacillus subtilis Isolated from Cow Dung Microflora. *Agricultural Research*, *1*(3), 273–279. https://doi.org/10.1007/S40003-012-0022-X/FIGURES/2

Teo, K. C., & Teoh, S. M. (2013). Preliminary biological screening of microbes isolated from cow dung in Kampar. *African Journal of Biotechnology*, *10*(9), 1640–1645. https://doi.org/10.4314/ajb.v10i9.

The coprophilous fungal community: an experimental system. (n.d.). Retrieved December 22, 2022, from https://agris.fao.org/agris-search/search.do?recordID=US9322775

Tiwari, P., & Juneja, S. K. (2016). Management of floral waste generated from temples of Jaipur city through vermicomposting. *International Journal of Environment*, *5*(1), 1–13. https://doi.org/10.3126/IJE.V5I1.14561

Ulrich, D. R., & Johnson, B.-B. (n.d.). *Fivefold Path Mission presents Brainstorming Conference in Cooperation with Planning Commission Government of India Bringing Homa Organic Farming into the Mainstream of Indian Agriculture System Proceedings*.

Umanu, G., Nwachukwu, S., & Olasode, O. K. (2013). *Effects of Cow Dung on Microbial Degradation of Motor Oil in Lagoon Water*.

Vakili, M., Zwain, H. M., Rafatullah, M., Gholami, Z., & Mohammadpour, R. (2014). Potentiality of Palm Oil Biomass with Cow Dung for compost production. *KSCE Journal of Civil Engineering*, *19*(7), 1994–1999. https://doi.org/10.1007/S12205-014-0420-7/METRICS

Vijayaraghavan, P., Vijayan, A., Arun, A., Jenisha, J. K., & Vincent, S. G. P. (2012). Cow dung: A potential biomass substrate for the production of detergent-stable dehairing protease by alkaliphilic bacillus subtilis strain VV. *SpringerPlus*, *1*(1), 1–9. https://doi.org/10.1186/2193-1801-1-76/FIGURES/4

Waghmode, M. S., Gunjal, A. B., Nawani, N. N., & Patil, N. N. (2018). Management of Floral Waste by Conversion to Value-Added Products and Their Other Applications. *Waste and Biomass Valorization*, *9*(1), 33–43. https://doi.org/10.1007/S12649-016-9763-2/METRICS

Walkley, A., & Black, I. A. (1934). An examination of the degtjareff method for determining soil organic matter, and a proposed modification of the chromic acid titration method. *Soil Science*, *37*(1), 29–38. https://doi.org/10.1097/00010694-193401000-00003

Waqas, M., Nizami, A. S., Aburiazaiza, A. S., Barakat, M. A., Asam, Z. Z., Khattak, B., & Rashid, M. I. (2019). Untapped potential of zeolites in optimization of food waste composting. *Journal of Environmental Management*, *241*, 99–112. https://doi.org/10.1016/J.JENVMAN.2019.04.014

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Bioconversion of Floral Waste into Biocompost by using Microbial Consortium from Cow Dung

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Abstract

In the majority of the developing nations like India, the flower waste age happens to a great extent during capacities, loves, services, celebrations, and so on. Debasement of floral waste is an extremely sluggish interaction. Flower squander debasement likewise expands the interest for agro-based items. In India, a large amount of flowers are offered to sacred places, and many flowers are wasted. Abandoned sanctuaries are carried into the sea or dumped in accessible locations in the country, causing extreme environmental pollution and health hazards. Thus the current study was embraced to foster an effective microbial consortium from cow manure for degradation of blossom squander. Cow compost harbors a different gathering of microorganisms that might be useful to people because of their capacity to deliver a scope of metabolites. This assists with corrupting profoundly complex natural mixtures and converts it into straight forward stable final result Bio-Compost. Therefore, in the current work rather than individual disengages an endeavor is made to foster microbial consortium from cow dung for debasement of floral waste. Also in this research microbial consortia developed from cow dung which is very effective for degradation of floral waste within 45 days and helps to produce effective biocompost speedily from floral waste and this biocompost are much better than commercial available biocompost and chemical fertilizer.

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Introduction

In India, it is common to use flowers when showing respect. These flowers will surely be replaced by new flowers that will surely age a lot of plant waste from safe havens, homes etc. In India about 80,000,000 tons of plant waste will surely be dumped into rivers.[8,4,9,18,17] and[11] it accumulates from contamination from kitchen waste. It also causes the progression of eels and worms to the site. Thus, a real and environmentally sustainable cycle

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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.

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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 to18 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 degradings 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	6.5x1010
2	Total coliform count/g	1.89x109
3	Total Yeast count and mold count/g	7.2x104
4	*Pseudomonas* count/g	5.9x104
5	Actinomycetes count/g	8.3x105
6	*Esherichia coli* count/g	2.36x104
7	Anaerobic bacterial count	<30
8	Thermophilic bacterial count	7.9x102
9	Anaerobic spore count	Nil
10	Thermophilic spore count	Nil
11	Anaerobic thermophilic spore count	Nil
12	*Salmonella*/25g	Absent
13	*Staphylococcus aureus* count/25g	Absent
14	*Shigella* sp.	Absent
15	Fecal Streptococcus sp	Present
16	*Flavobacterium*sp	Absent
17	*Alcaligens* sp.	Present
18	*Bacillus* sp.	Present
19	*B.stearothermophilus* and *B.cereus*	Present
20	*Cellulomonas* sp.	Present
21	*Streptococcus* sp.	Present
22	*Sarcina* sp.	Present
23	*Serratia* sp.	Present
24	*Nocardia* sp.	Present
25	*Mucor* sp.	Present
26	*Rhizopus stolonifer*	Present
27	*Aspergillus* sp.	Present
28	*Penicillium* sp.	Present

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

Cow dung based biodynamic arrangements show that they are ruled by *Bacillis 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 against11 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 flora 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.

REFERENCES

A. R, J. (2013). Flower Waste Degradation Using Microbial Consortium. *IOSR Journal of Agriculture and Veterinary Science*, *3*(5), 01–04. https://doi.org/10.9790/2380-0350104

Adebusoye, S. A., Okpalanozie, O., & Nweke, N. C. (2015). Isolation and characterization of bacterial strains with pyrene metabolic functions from cow dung and Terminalia catappa phylloplane. *Biocatalysis and Agricultural Biotechnology*, *4*(4), 778–783. https://doi.org/10.1016/j.bcab.2015.08.015

Adegunloye, D. V., Adetuyi, F. C., Akinyosoye, F. A., &Doyeni, M. O. (2007). Microbial analysis of compost using cowdung as booster. *Pakistan Journal of Nutrition*, *6*(5), 506-510.

Barad, G., Upadhyay, A., & Professor, A. (2016). Degradation of Flower Wastes: A Review. *IJSRD -International Journal for Scientific Research & Development*|, *4*(04online), 2321–2613. www.ijsrd.com

Bharti Sharma and Maneesha Singh. (2015). *INTERNATIONAL JOURNAL OF ADVANCES IN Isolation and characterization of bacteria from cow dung of desi cow breed on different morpho-biochemical parameters in Dehradun ,*. *4*(2), 276–281.

Boricha, H., &Fulekar, M. H. (2009). Pseudomonas plecoglossicida as a novel organism for the bioremediation of cypermethrin. *Biology and medicine*, *1*(4), 1-10.

DEBERTOLDI, M., VALLINI, G., & PERA, A. (1983). The biology of composting: A review. *Waste Management & Research*, *1*(2), 157–176. https://doi.org/10.1016/0734-242x(83)90055-1

Eroa, M. G. (2015). Production and characterization of organic fertilizer from tubang-bakod (jatrophacurcas) seed cake and chicken manure. *Asia Pacific Journal of Multidisicplinary Research*, *3*(4), 9–13. http://www.apjmr.com/wp-content/uploads/2015/11/APJMR-2015-3.4.5.02.pdf

Girija, D., Deepa, K., Xavier, F., Antony, I., & Shidhi, P. R. (2013). Analysis of cow dung microbiota-A metagenomic approach. *Indian Journal of Biotechnology*, *12*(3), 372–378.

Godambe, T., & Fulekar, M. H. (2016). Cow dung Bacteria offer an Effective Bioremediation for Hydrocarbon-Benzene. *International Journal of Biotech Trends and Technology*, *18*(1), 13–22.

Gupta, K. K., Aneja, K. R., & Rana, D. (2016). Current status of cow dung as a bioresource for sustainable development. *Bioresources and Bioprocessing*, *3*(1). https://doi.org/10.1186/s40643-016-0105-9

Gupta, V., & Sapaliga, H. (2017). Application of household generated floral wastes (tagetes spp.) as biofertilizer for the Tulsi (Ocimum tenuiflorum) plant. *International Journal for Scientific Research and Development*, *5*(3), 1102–1104. http://www.ijsrd.com/articles/IJSRDV5I30851.pdf

Ikuesan, F. A., Boboye, B. E., &Adetuyi, F. C. (2015). Cow dung as inoculum carrier for the degradation of crude oil. *Sky Journal of Microbiology Research*, *3*(4), 47-54.

Kumar, M., &Swapnavahini, K. (2012). Nutrient reduction and biogas production of rose residue by anaerobic digestion in a batch reactor. *Int J Adv Res Sci Technol*, *1*(2), 125-129.

Khan, J. A., Ranjan, R. K., Rathod, V., & Gautam, P. (2011). Deciphering Cow Dung for Cellulase Producing Bacteria. *Experimental Biology*, *1*(1), 139–147.

Mahindrakar, A. (2018). Floral Waste Utilization- A Review. *International Journal of Pure & Applied Bioscience*, *6*(2), 325–329. https://doi.org/10.18782/2320-

7051.5357

Maity, P. K. (2016). *Impact of Waste Flower on Environment*. *4*(Viii), 341–342.

Makhania, M. and U. A. (2015). Study of Flower Waste Composting to Generate Organic Nutrients. *International Journal of Innovative and Emerging Research in Engineering*, *2*(2), 145–149.

Pan, I., Dam, B., & Sen, S. K. (2012). Composting of common organic wastes using microbial inoculants. *3 Biotech*, *2*(2), 127–134. https://doi.org/10.1007/s13205-011-0033-5

Paulin, B., & O´Malley, P. (2008). Compost production and use in horticulture. *Department of Agriculture and Food*.

Pergola, M., Persiani, A., Palese, A. M., Di Meo, V., Pastore, V., D'Adamo, C., & Celano, G. (2018). Composting: The way for a sustainable agriculture. *Applied Soil Ecology*, *123*(October), 744–750. https://doi.org/10.1016/j.apsoil.2017.10.016

Radha, T. K., & Rao, D. L. N. (2014). Plant Growth Promoting Bacteria from Cow Dung Based Biodynamic Preparations. *Indian Journal of Microbiology*, *54*(4), 413–418. https://doi.org/10.1007/s12088-014-0468-6

Sánchez, Ó. J., Ospina, D. A., & Montoya, S. (2017). Compost supplementation with nutrients and microorganisms in composting process. *Waste Management*, *69*(26), 136–153. https://doi.org/10.1016/j.wasman.2017.08.012

Saranraj, P., & Stella, D. (2012). *Vermicomposting and its importance in improvement of soil nutrients and agricultural crops*. *1*(1).

Singh, P., Borthakur, A., Singh, R., Awasthi, S., Srivastava, P., & Tiwary, D. (2017). Utilization of temple floral waste for extraction of valuable products: A close loop approach towards environmental sustainability and waste management. *Pollution*, *3*(1), 39–45. https://doi.org/10.22059/poll.2017.59570

Teo, K. C., & Teoh, S. M. (2011). Preliminary biological screening of microbes isolated from cow dung in Kampar. *African Journal of Biotechnology*, *10*(9), 1640–1645. https://doi.org/10.5897/AJB10.1589

Tiwari, P., & Juneja, S. K. (2016). Management of Floral Waste Generated From

Temples of. *International Journal of Environment*, *5*(1), 1–13.

Waghmode, M. S., Gunjal, A. B., Nawani, N. N., & Patil, N. N. (2018). Management of Floral Waste by Conversion to Value-Added Products and Their Other Applications. *Waste and Biomass Valorization*, *9*(1), 33–43. https://doi.org/10.1007/s12649-016-9763-2

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Bioconversion of Floral Waste into Biocompost by using Microbial Consortium from Cow Dung

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Abstract

In the majority of the developing nations like India, the flower wasteage happens to a great extent during events, marriage ceremonies services, celebrations, and so on. Decomposition of flower waste is a very slow process. Flower squander debasement likewise expands the interest for agro-based items. In India, a large amount of flowers are offered to sacred places, and many flowers are wasted. Abandoned sanctuaries are carried into the sea or dumped in accessible locations in the country, causing extreme environmental pollution and health hazards. Thus the current study was embraced to foster an effective microbial consortium from cow manure for degradation of blossom squander. Cow compost harbors a different gathering of microorganisms that might be useful to people because of their capacity to deliver a scope of metabolites. This assists with degrading profoundly complex natural mixtures and converts it into straight forward stable final result BioCompost. Therefore, in the current work rather than individual disengages an endeavor is made to foster microbial consortium from cow dung for debasement of floral waste. Also in this research microbial consortia developed from cow dung which is very effective for degradation of floral waste within 45 days and helps to produce effective biocompost speedily from floral waste and this biocompost are much better than commercial available biocompost and chemical fertilizer.

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Keywords

Bio-Compost;
Cow-Dung;
Floral Waste;
Microbial Consortium;
Metabolites.

Introduction

In India, it is common to use flowers when showing respect. These flowers will surely be replaced by new flowers that will surely age a lot of plant waste from safe havens, homes etc. In India about 80,000,000 tons of plant waste will surely be dumped into rivers.[8,4,9,18,17] and[11] it accumulates from contamination from kitchen waste. It also causes the progression of eels and worms to the site. Thus, a real and environmentally sustainable cycle

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of flower waste rot is required. Growing people regularly take an increasing interest in agricultural products. Crop creation is all things considered extended by using manures. Usage of substance compost causes its biomagnifications in the laid out hierarchy. Consistent use of substance excrements lessens the dirt extravagance. They may in like manner result gambles unexpectedly. Biocompost is hence on extending demand.[2]

The undigested accumulation of consumed food stuff that herbivorous bovine animal species excrete is known as cow dung. It primarily contains lignin, cellulose, and hemicelluloses since it is a 3:1 mixture of faeces and urination. It also includes 24 other minerals, including nitrogen and potassium, as well as small amounts of sulphur, iron, magnesium, copper, cobalt, and manganese. Similar to the native Indian cow, cross-bred cows have lower levels of calcium, phosphorus, zinc, and copper. Cow faeces is home to a wide range of microorganisms and has a rich microbiological diversity. According to The Hindu (2011), 69.9% of India's population resides in rural areas, where cows (*Bos indicus*) are common dairy animals and produce 9 to 15 kg of waste each day.[7] Piece of cow manure is around 80% water and supports an organization of undigested plant material that is well off in supplements, smaller than normal natural elements, and their secondary effects. Cow manure small verdure contains copious number of *bacilli*, *lactobacilli* ,*cocci* and a couple of perceived and unidentified developments and yeastsAccording to ware *et al.* (1988) the lower stomach of cattle contains a variety of microorganisms such as *Lactobacillus plantarum*, *Lactobacillus acidophilus*, *Bacillus subtilis, Enterococcus diacetylactis*, *Bifidobacterium,* and yeast (*usually Saccharomyces cerevisiae*) Microbes disappear after the soil decomposes several times and *actinomycetes*. There are a couple of affirmations to show that new cow manure and cow pee are antifungal and clean in nature, which might be a result of outflow of antimicrobial metabolites by cow compost smaller than usual verdure. Our endeavor through this study is to separate and depicted the microorganisms from cow excrement of desi cow breed on different morphological and biochemical reason and study their worth with the preliminary natural screening of microorganisms.[5] Cow manure was actually exhibited to be rich in hydro-carbonolastic creatures spread out the relationship of lignin defiling life structures with degradation of environmental toxins. As shown by them, such smaller than expected living things may be withdrawn from squander materials are good for corrupting a wide extent of toxic substances.[3]

The process of fertilizing the soil is seen as an active, thermophilic, strong state ageing cycle in which various natural elements are transformed into more stable mixes that are the precursors of humic compounds.[16,14.6] there are, however, a few naturally occurring microbes that may transform organic waste into valuable resources, such as plant nutrients, and lower the C: N ratio to improve soil productivity. In order to maintain supplement fluxes from one structure to the next and to prevent environmental discomfort, these bacteria are also essential.[13]

Materials and Methods

Collection of Flower Waste and Cow Dung

Flower wastes were collected from the following selected shrines, including Rajkot, Hari darshanam temple, wedding services and capacities.We collected flower waste included marigold and rose flowers, among others. In this study, only flower waste was used to treat soil without stems, roots and leaves. Also we collect cattle manure sample for tests to isolate suitable microorganisms to neutralize floral waste from Satyakam Gaushala., Rajkot.

Floral Waste Extraction

After collecting floral waste from various locations, biodegradable waste containing wreaths and flowers was separated from non-biodegradable parts containing plastic, paper, twine, and other waste. The detached flower shards were spread out on paper for 48 hours to air dry. The air-dried samples were then ground in a blender processor to produce 300 cc of flour starch paste. The homogenized mixture was manufactured again in a combination processor. This mixture then let sit for three hours to allow any debris to settle. The muslin was sieved and the clear supernatant was extracted. The resulting filtrate was described as floral concentration.[12]

Preparation of Floral Waste Medium

Unique pH of the flower extricate was 4.7, being excessively acidic, it was not reasonable for development of normal microbes, so pH was acclimated to 7.2 and 5.6 to separately uphold the development of microorganisms. For hardening of media, 3.0 g/100 ml of agar powder was included the flower remove, trailed by media sanitization at 15psi 121 ^{0}C for 30 minutes.[12]

Isolation and Enrichment of Floral Waste Degrading Microorganisms

Cow dung sample has been collected from Satyakam Gaushala. 1 g of each cow dung test was immunized in 100 ml of flower waste medium. These vessels were incubated at 28° C and 125 rpm for 3 days. Then let the jar sit for two hours to allow the debris to settle. The weakened supernatant was then spread over plant effluent medium. Plates were incubated at 28°C until progress was observed as a deposit on agar plates.[2]

Development of Microbial Consortia

We isolate nine different bacterial colonies which are able to degrade floral waste by using floral waste agar plate and further various combinations of nine bacterial separates were ready and utilized for biocomposting readiness. Out of which, the combinations giving fast decomposition of flower wastes was chosen for the consortium preparation. A loopful development from 24 hrs. Old bacterial culture of various life forms in chosen combinations was inoculated in minimal broth containing flower wastes. Stock was incubated at 37 ^{0}C for 48 hrs. After incubation, this broth was utilized as consortium and afterward 20 % (v/w) of this consortium as inoculums was added to the flower wastes.[15]

Biocomposting of Floral Waste

All natural waste was opened and accumulated in the form of flowers. As a result, the thicker pieces that are full tend to separate quickly and make their way to the fertilizer feed, so the accumulated flower debris is shredded into smaller pieces, renewing the rate of the fertilizer plan. Soil is added to the floral waste to absorb moisture and support microbial development. A 2 cm high coco coil chamber layer was provided to give awareness of the overwhelming state of the lower area. It was covered with garden soil. At the highest soil mark, discarded flowers were added with less than 25% of his consortium. The chamber was closed with an arbitrary layer of soil and the floral waste of the immunized consortium was stored in a moist, weak place for 43 to 45 day to fertilize the soil for fouling[12]

Chamber were prepared having the following combination

Soil +Floral waste (Control)

Soil+ Floral waste + consortium (experimental)

Physico-Chemical Analysis of Biocompost

Physical and synthetic properties including temperature, pH, electrical conductivity (EC), all natural carbon, pure natural materials, hard fast nitrogen, full scale phosphorus, hard fast potassium, and C/N expansion been studied. To measure pH, 15 g of fertilizer was mixed with 30 ml of purified water and left on the shaker for 1 hour. Filtration was stopped and the pH of the filtrate was checked using a pH meter. The electrical conductivity of the filtrate was evaluated with a conductivity meter. To assess moisture, 5 g of ordered compost was placed in a dry petri dish and dried to a uniform weight on a 55°C grill before assessing uncured moisture.[10] Fertilizers were diluted at a ratio of 1:10 (w/v) and held for 45 min on a rotary shaker at 150 rpm. This model was used for additional evaluation of excreta. Nitrogen content was measured by the Kjeldahl method, while normal carbon content was recognized by the Walkley and Dark (1934) system.[19] To process 0.2 g of test, treat 10 ml of a mixture of H_2SO_4 and $HClO_4$ (5:1) at 300°C ± 5°C for 2 hours. The treated model was used to confirm pure phosphorus using the tin chloride technique. The Na, K association was not perfectly balanced using the pyrophotometer. The Ca and Mg elements in the model are also present somewhere in the environment using the atom maintenance spectrophotometer. The C: N scoping is not completely offset by the targeted potential gains in C and N.[1]

Observation Tables

Table 1: Cultural and Morphological characteristics of the isolated microorganisms

Sr. No	Isolates	Morphology	Gram's Nature
1	Isolate 1	Rods	Gram positive
2	Isolate 2	Rods	Gram negative
3	Isolate 3	Rods	Gram positive
4	Isolate 4	Rods (in chain)	Gram positive
5	Isolate 5	Rods	Gram positive
6	Isolate 6	Rods	Gram positive
7	Isolate 7	Rods (in chain)	Gram positive
8	Isolate 8	Rods	Gram positive
9	Isolate 9	Rods (in chain)	Gram negative

Note: we perform Gram's staining method for Identify Gram positive or Gram negative.

Table 2: Enrichment process Analysis of developed microbial consortium

Sr. No.	Trials of Developed Microbial Consortium	Days for Degradation of Floral waste
1	First trial	61
2	Second trial	54
3	Third trial	49
4	Fourth trial	43
5	Fifth trial	44
6	Sixth trial	43

Table 3: Physico-Chemical Analysis of Finished Compost with commercially available compost

Sr. No.	Parameter	Control (Commercially available Compost)	Finished Compost
1	Color	Brown	Dark Brown
2	Odor	Odorless	Odorless
3	Moisture (%)	28	39
4	pH	7.4	7.1
5	Electrical conductivity ($mScm^{-1}$)	3.6	4.3
6	Nitrogen (%)	1.59	1.99
7	Carbon (%)	42.12	59.69
8	C:N ratio	26.49	29.99
9	P ($g\ kg^{-1}$)	3.6	5.3
10	K ($g\ kg^{-1}$)	17.6	21.7
11	Ca ($g\ kg^{-1}$)	4.3	5.8
12	Mg ($g\ kg^{-1}$)	0.41	0.53

Fig. 1: Finished Biocompost produce from the floral waste

Results and Discussion

Discussion

By performing Gram's staining the cultural and morphological characteristics of isolated microorganisms, total nine bacterial strains were isolated in which seven is Gram's Positive and two are Gram's Negative strain shows in table-1 also shows the shape of the bacterial strain in which we found rod shape bacteria. Table-2 saws the enrichment process of developed microbial consortium in which first trail consortium takes 61 days for degradation of floral waste and we continued with this similar microbial consortium for enrich process and after fourth trial it takes only 43 days which means consortia was enriched because after sixth trial similar results found. Fig.1 shows the finished compost made from floral waste by using microbial consortium developed from cow dung. Analysis of physico-chemical parameters shows that our finished is better than commercially available compost in table-.3 in which check total 12 different parameters by using suitable procedure and we found our finished biocompost are excellent in quality because amount of N P K and C: N ratio is shows good in finished compost also other parameters like pH, Electrical Conductivity, moisture, Ca, Mg and odor shows good results compare to commercially available compost.

Conclusion

With this research we concluded that microbial flora of cow dung are effective for degradation of floral waste and help to convert floral waste into the biocompost in this study we isolate total nine number of bacterial colonies which are capable to degrade floral waste and we developed consortium from this nine microbial colonies and after successful enrichment process microbial consortium are able to degrade floral waste speedily it takes around 43 days and after that we make biocompost by using this consortia and finished biocompost is found much better than the commercially available compost. So the present research saws positive results and it helps to reduce environment pollution by degrading floral waste and also helps for production of effective biocompost alternate of chemical fertilizer and which is very useful in organic farming, enhance soil fertility and plant growth also helps to reduce the soil pollution.

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Conflict of Interest

The authors declare no conflict of interest.

References

1. Adhikari, B. K., Barrington, S., Martinez, J., & King, S. (2009). Effectiveness of three bulking agents for food waste composting. Waste management, 29(1), 197-203
2. A. R, J. (2013). Flower Waste Degradation Using Microbial Consortium. IOSR *Journal of Agriculture and Veterinary Science*, 3(5), 01–04.
3. Adebusoye, S. A., Okpalanozie, O., & Nweke, N. C. (2015). Isolation and characterization of bacterial strains with pyrene metabolic functions from cow dung and Terminalia catappa phylloplane. *Biocatalysis and Agricultural Biotechnology,* 4(4), 778–783.
4. Barad, G., Upadhyay, A., & Professor, A. (2016). Degradation of Flower Wastes: A Review. IJSRD -*International Journal for Scientific Research & Development*|, 4(04online), 2321–2613.
5. Bharti Sharma and Maneesha Singh. (2015). International Journal of Advances In Isolation and characterization of bacteria from cow dung of desi cow breed on different morpho-biochemical parameters in Dehradun ,. 4(2), 276–281.
6. Debertoldi, M., Vallini, G., & Pera, A. (1983). The biology of composting: A review. Waste Management & Research, 1(2), 157–176.
7. Gupta, K. K., Aneja, K. R., & Rana, D. (2016). Current status of cow dung as a bioresource for sustainable development. *Bioresources and Bioprocessing,* 3(1).
8. Gupta, V., & Sapaliga, H. (2017). Application of household generated floral wastes (tagetes spp.) as biofertilizer for the Tulsi (Ocimum tenuiflorum) plant. *International Journal for Scientific Research and Development,* 5(3), 1102–1104.
9. Maity, P. K. (2016). Impact of Waste Flower on Environment. 4(Viii), 341–342.
10. Maiti, S. K. (2003). Handbook of methods in environmental studies (Vol. 2, pp. 110-121). Jaipur: ABD publishers.
11. Makhania, M. and U. A. (2015). Study of Flower Waste Composting to Generate Organic Nutrients. *International Journal of Innovative and Emerging Research in Engineering,* 2(2), 145–149.
12. Mulay, Y., Owal, S., Chougule, P., & Pandit, A. (2020). Composting of floral waste by using indigenously isolated microbial consortium: an approach towards the Environment sustainability and waste management. *Int J Environ Agric Res,* 6(4), 20-26.
13. Pan, I., Dam, B., & Sen, S. K. (2012). Composting of common organic wastes using microbial inoculants. 3 *Biotech*, 2(2), 127–134.
14. Pergola, M., Persiani, A., Palese, A. M., Di Meo, V., Pastore, V., D'Adamo, C., & Celano, G. (2018). Composting: The way for a sustainable agriculture. Applied Soil Ecology, 123(October), 744–750.
15. Pindi, P. K. (2012). Liquid Microbial Consortium-A Potential Tool for Sustainable Soil Health. J Biofertil Biopestici 3: 124. Page 2 of 9 Volume 3• Issue 4• 1000124 J Biofertil Biopestici ISSN: 2155-6202 JBFBP, an open access journal consortium) by artificial culturing (Doctoral dissertation, these are known as biofertilizers or microbial inoculants).
16. Sánchez, Ó. J., Ospina, D. A., & Montoya, S. (2017). Compost supplementation with nutrients and microorganisms in composting process. Waste Management, 69(26), 136–153.
17. Tiwari, P., & Juneja, S. K. (2016). Management of Floral Waste Generated From Temples of. *International Journal of Environment*, 5(1), 1–13.
18. Waghmode, M. S., Gunjal, A. B., Nawani, N. N., & Patil, N. N. (2018). Management of Floral Waste by Conversion to Value-Added Products and Their Other Applications. Waste and Biomass Valorization, 9(1), 33–43.
19. Walkley, A., & Black, I. A. (1934). An examination of the Degtjareff method for determining soil organic matter, and a proposed modification of the chromic acid titration method. Soil science, 37(1), 29-38.

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