ISSN: 2347-4688, Vol. 10, No.(3) 2022, pg. 346-351

Current Agriculture Research Journal

www.agriculturejournal.org

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.

Article History

Received: 19 September 2022

Accepted: 05 Decmber 2022

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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Doi: http://dx.doi.org/10.12944/CARJ.10.3.18

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 yeasts According 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.

Acknowledgement

The authors sincerely thank the Department of Microbiology, Atmiya University, Rajkot for providing all kinds of facilities related to the field and laboratory work of the project.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest

The authors declare no conflict of interest.

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