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## Paradigm Study on Composting the Dry Leaves to Alleviate the Consequences of Burning Them

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Kavitha S<sup>1</sup>, B K Kempegowda<sup>2</sup>

<sup>1</sup>Maharani's Science College for women, J L B Road, Mysuru-570005, Karnataka, India

<sup>2</sup>Government First Grade College, Nanjangud, Mysuru-571301, Karnataka, India

**Corresponding Author- Kavitha S**

**Email-** kavithadinesh026@gmail.com

**DOI-10.5281/zenodo.8344324**

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### Abstract:

Many researchers, environmentalists and scientists are expressing deep concerns about the changes occurring in the climate and rise in temperature of the earth. Almost of naturally available resources are being consumed to produce electricity and other needs of the humans, upfronting the rise in mercury level. The hazard of global warming is frequently causing severe damages to the environment. Many of the peoples are still unaware of these consequences and repeatedly doing their activities which heavily contributes the global warming. One such activity is burning of dry leaves of the gardens, park, and many other places instead of disposing scientifically. This action provides a way to elevate the pollution along with rise in temperature of the earth. Since, it is need of an hour that this must be studied to alleviate the consequences. This study analyses the impacts of burning the dry leaves in the urban areas for the emission of poisonous gasses and plans for the measures to dispose these leaves scientifically and productively. Researchers try out the measures for their effectiveness and efficient ness over the time. Researcher will initially analyse the effect of this activity on environment and correspondingly plan and implement the measure to alleviate the problem. This study enables the incorporation of simple activities in targeted area which helps in bringing back the level of mercury. This will be the qualitative and quantitative research approach to study the common activity of the society which must be modifyscientifically to save the earth from global warming.

**Keywords:** Dry leaves, C/N ratio, total nitrogen, Decompose, Composting, hazard gasses.

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### Introduction

As per the concern towards the global morning and its consequences it is important to bring about innovative ways to deal with the problems. Rise in global temperature directly points towards the emission of the hazardous gasses in to the environment. Burning the waste contributes to this in maximum extent. Numerous studies were done to study and analyse the impact of burning the waste instead of proper scientific disposal. At the time of spring the dry leaves collected in the back yard or in gardens were not completely disposed in a proper way. Instead of positive way the commonly used way of disposal is burning them away.

Biomass wastes, particularly dry leaves are generated in voluminous amounts in a year. Since the natural process of degradation of this fallen leaves is time consuming and it is difficult mainly in urban

areas where more of the land id concretised, the disposal done through burning instead of composting it. This adds to the air pollution. People are often thought of burning these leaves to get rid of the waste not even realising the impact of it on the air purity. Even though it is banned under the environment protection act people are totally unaware about the impact and alternative ways to deal with it. So, it is the need of an hour to educate them against their unconventional methods.

The project is led by the primary data collected through survey and observation by the researcher. Based on this, the study approaches the alternative way to pass out conventional composting of dry leaves with the different way which is user-friendly and less time consuming. Researcher done a paradigm study to give out the method of composting in the urban parks which are

main contributors of dry leaves with short spanned method yielding good quality compost reducing the usual manpower and cost to collect the waste and compost for the same parks respectively to the local government municipalities.

Qualitative study of the compost prepared by the researcher within controlled conditions & with added nutrients of the dry leaves in comparison with the usual compost is framed in this report. Following by some practical approaches which can be implemented towards the positive lane of controlling the air pollution.

**Need of the study:** Particularly in urban areas burning dry leaves is the easiest way of getting rid of them, but it effects the environment tremendously. Apart from air pollution most of the time it may causes a bigger fire than intended. Incomplete burning or smouldering leaf piles also releases toxic particulates into the air<sup>1</sup>.

In cities most of the gardeners, sweepers and residents are openly seen burning dry and fallen leaves. This adds the pollution into the air which is already polluted. So, it's the need of an hour to implement the proper handy method to overcome this unconventional method of disposal. People must be well aware about the consequences of this process and must follow the prescribed method by the government to alleviate the problem.

**Objectives:**

1. To reduce the pollution caused by burning of dry leaves.
2. To find the alternative way for the waste dry leaves management.
3. To minimize the rate of decomposition of dry leaves.
4. To study the chemistry of prepared dry leaves compost.
5. To use the compost for the gardening purpose.
6. To reduce the cost for fertilizers and other compost by replacing these with prepared dry leaves compost.
7. To put forward this project before authorities for its asset value in extricating from waste management and over spending.

**Findings of the survey:** Mysuru is the second largest city in Karnataka with growing population of 12.61 lakh. Solid waste generated per day is around 450 tonnes<sup>3</sup>. City has 7 zero waste management units among which only 3 are in action where as

other units are not effectively functioning. Researcher visited one zero waste management unit located at Kumbhar Koppal, Mysore which is highly functioning among other units. In zero waste management units, initial process is to collect the waste from the household in daily basis followed by the segregation. Wet and dry wastes are segregated simultaneously. Wet waste is further converted as compost which will take around 3 to 4 months to mature. They used to sell this compost. Revenue generated by sale of recyclables is around 15- 30k/month<sup>4</sup>.

Researcher concentrated on the dry leaves waste hence targeted the municipal parks and city parks. Around 6 city parks and 20 local municipal parks are visited for the observational study. With the questionnaire of 15 items<sup>5</sup> were contemplated during the survey. Part of the data was collected through the maintainers of the parks where as other part of data was collected by the researcher via observation.

Researcher found that government is facilitating all the required materials and equipment's in all the well-known established parks and garden for the sustainable waste management. Maintains of the same is under the budget of around 15 to 20 lakh per month approximately. All dry leaves pile is managed in a scientific way and converted into manure. Which will take maximum six to eight month's time to decompose. And they are using organic and chemical fertilizers for the better management. In overall view this is in the case of well-established and large-scale gardens. But in case of small parks and gardens this method is not effectively followed. Not even the parks are maintained properly in most of the places. Scientific method of decomposition is out of syllabus for many of the small-scale urban parks.

In most of the parks, waste is transported to zero waste management unit and in some cases, waste is burned or dumped under mud without proper composting treatment. Here to maintain the plants they are using the fertilizers brough from the market which aids to the expenditure to MCC. Waste is not used efficiently to reduce the cost of expenditures in these targeted sites. So, our concern is about the small-scale parks waste management in a sustainable manner. Our approach is quite reliable in this way of managing the local parks and gardens in

ward levels. This will support the objectives of mcc in full pledge and will reduce the cost and time of the management of the waste.

Concentrating on the analysis of burning dry leaves only the characterisation upfront all the organic and inorganic matters emitted. This clearly exhibits the harmfulness of smoke from dry leaves burning. This comparison study was the substructure for our report which look forward to alleviate this harm.

### Materials And Method

**Sampling:** Dry leaves from various trees found around the maharani's science college for women, J L B Road, Mysore was collected from the first week of September to October for 60 days on daily basis. The collected mound was shredded into small particle size of 1-5mm<sup>6</sup>. These pieces are filled into the compost machine for further procedure.

**Materials:** Spintech polyethylene composter hot pile compost bin (SCB 100) was used for the project. Inside of the compost machine nitrogen rich soil was layered for the nitrogen supplement. 10 grams/ week of urea added for nitrogen enrichment and to balance C/N ratio. Water is sprayed on the freshly shredded leaf pile addition. With the help of stick daily compost was mixed for uniform concentration.

**Analysis:** The compost was maintained for moisture, and carbon to nitrogen ratio. on proper intervals urea as a nitrogen supplement<sup>7</sup> is added. pH of the compost is monitored on weekly basis. From September to December complete decomposition was monitored for uniform concentration and maturity. On the first week of January compost seems to be matured and it was subjected to laboratory analysis. The random sample from the matured heap was sent for analysis.

### Result and Discussion

The matured sample of dry leaves compost was analysed referring the standard values. The results of analysis are satisfied.

**Moisture:** Initially 60% of moisture<sup>8</sup> is maintained by spraying water into the compost bin. Followed by 30% based on the decomposition rate. At the initial stage the decomposition rate is slow to enhance this moisture content plays a key role.

**Temperature:** It plays a vital role in decomposition process. With the help of

normal glass thermometer temperature was tracked. at first week it is found to be 46.3 °C and gradually decreases to 40.8 °C – 36.4 °C at the end of September. The temperature reduces as the decomposition completes. It significant the maturity of the compost.

**pH:** Due to the presence of organic acids as a by-product of decomposition, value of pH is usually high at the beginning. Later it will reduce to the lower pH. Compost of 6.5 to 8.5 pH is suitable for agriculture. Our compost pH is monitored using the pH paper. The pH of matured compost was found to be 8.24 which are within the significant limits.

**Salinity:** This indirectly affects the pH of the compost. Salts dissolved in the compost promote pH and impart adverse effect on compost<sup>7</sup> when applied on plants as they absorb more ions. At maturity dry leaves compost analysed for salinity and values found to be 0.18%.

**Total organic carbon:** Is a direct measurement of total carbon present in organic and inorganic form in the compost. It is necessary for a compost to be have essential carbon content by weight through which carbon to nitrogen ratio has to be estimated. The matured compost was analysed for 34.77% of total carbon compound.

**Total organic nitrogen:** Total nitrogen includes all forms of nitrogen that are organic N, ammonium N and nitrate N. for a matured compost ammonium nitrogen levels are high whereas it values more in the initial stages of composting. at final the nitrogen is present in the organic form only and varies from 1 to 5 % for appropriate compost<sup>8</sup>. This value for the dry leaves compost from kjeldhals method was determined to be 1.40%.

**C/N ratio:** This is the ratio of total carbon to the total nitrogen in the compost. It may be used as an indicator of stability of compost and Nitrogen availability. For a compost with high C/N ratios (>30) will likely immobilise N if applied to soil, while those with low C/N ratios (<20) will mineralize organic N to plant available inorganic nitrogen. The organic form of nitrogen is slowly available for plants<sup>9</sup>. Dry leaves compost's C/N ratio was found to be 24.83 where, N is available in organic form.

The determined values of the quality parameters are mentioned in the table-1 below:

Sl. no.	Parameters	Result	Units	Protocol
1	Total organic carbon	34.77	%	FCO 1985: amended up to July 2021 schedule iv part C
2	Total nitrogen as N	1.40	%	
3	C/N ratio	24.83	-	
4	pH value	8.24	-	
5	Salinity as NaCl	0.18	%	
6	Moisture	27	%	
7	Temperature	32.3	°C	

**Table 1: Analysed parameters of prepared compost of dry leaves.**

**Suggestions:** Plant bases compost can be prepared only by dry leaves also. This can qualify all the required quality parameters. Hence at the targeted areas means in small scale parks of MUDA instead of burning, dumping or transporting the dry leaves, it can be converted it into compost with the help of this study. Researcher wants to quote some of the beneficiary ideas from this study as follows.

This method of composting alleviates the hazard produced by burning the dry leaves.

1. This followed procedure reduces the time of degradation of dry leaves to 4 months which usually takes 7 to 8 months.
2. It may minimize the work load of workers, garbage collectors and transporters because waste from garden is deal within the parks.
3. It may reduce the cost required for the other methods of composting in zero waste management units, since the cost required in this project is less in comparison.
4. This project implementation can effectively lessen the cost of additional purchase of fertilizers for the park maintains.
5. This is one of the easiest procedures to follow, hence workers and maintainers can be easily educated about this.
6. This definitely saves the time and cost of the conversion of waste into compost.
7. The formed compost is qualitatively up to mark compared to common compost.
8. Dry leaves compost exhibits positive impacts on the plants when used in place of other fertilizer or compost.
9. The cost for purchasing fertilizers from retailers can bring down and revenue generation by this is maximised.

#### **Conclusion**

This paradigm study portrays the way of composting the dry leaves without any other aids which are generally not available

in the parks or gardens. So, the waste management in the parks become way easier and effective. Educating the workers about this study is conventional and implementation of the same is much practical compared to other methods. From all the dimensions this study is much effective. The quality parameters of prepared compost are qualitatively and quantitatively much better referring from the standard data. Hence this study supports in succeeding the objectives formed before.

**Acknowledgments:** We greatly acknowledge to Karnataka Science and Technology Academy, Department of Science & Technology, Government of Karnataka to provided financial assistance for doing this research work.

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