

An Attempt for Management of Tobacco and Wrappers from Cigarette Butts: A Case Study

Pondhe G.M¹.Kasar S.R²., Naikwadi G.B³ and Talole Rutuja.S⁴

Associate Professor, Department of Environmental Science, P.V.P.College, Pravaranagar, Maharashtra, India¹

P.G. Student, Department of Environmental Science, P.V.P.College, Pravaranagar, Maharashtra, India^{2,3,4}

(Affiliated to Savitribai Phule Pune University, Pune, India)

ABSTRACT: Present work deals with management of tobacco and wrappers from cigarette butts. Cigarette Butts are most littered item in the environment. Approximately 4.5 trillion cigarette butts (765400 ton) generated every year and it is estimated that it can produce 26661.20 ton tobacco waste and 82776.29 ton wrappers in a year. Thrown away cigarette butts of different brands (such as Marlboro, Gold Flake, Gold Flake Light, Double Burst, and Bristol etc.) having different diameter, length and weight was collected manually from places like Bus depot, Cinema halls, Hotels, etc. These cigarette butts cause nausea or even at one end solid waste and or toxic pollution. Therefore in present work, composting of tobacco and wrappers was done along with substrate. It is observed that within 30 days, the compost shows rich N, P, and K content which in term helps to cycling the minerals in biogeochemical cycle and for sustainable development.

KEYWORDS: Wrappers, Tobacco, Nicotine, Tons, Compost.

I. INTRODUCTION

Cigarette is a slender rolled tobacco enclosed in paper and used for smoking. Most of cigarettes contain a "reconstituted tobacco" product known as "sheet", which consists of processed raw tobacco along with glue, chemicals and fillers. This material is then sprayed with extra nicotine to maintain average 12mg of Nicotine per cigarette and shaped into curls (Rabinoff Michael et al, 2007;Juliano et al., 2011). Now days, there are many notable cigarette brands available in world market such as, Amber Leaf, Aemy Club, Ardath-Ardath, Bel Air, Benson & Hedges, Marlboro, Gold Flake, Bristol, Berkeley, Camel, etc. (Leatherdale et al.,2009). It is estimated that cigarette smoking emits 84 megatons of CO₂ in atmosphere every year (Talaiekhazani et al., 2018), which may one of the causes for climate change (Solomon et al., 2009). Similarly, the Nicotine which is present in cigarette acts as psychoactive material. **It is** an alkaloid and is one of a group of nitrogenous organic compounds that have marked physiological effects on humans. In its psychoactive effects, nicotine stands a unique substance for biphasic effect. When inhaled in short puffs it has a stimulant effect, but when smoked in deep drags it can have a tranquilizing effect. This is why smoking can feel invigorating at some times and can seem to block stressful stimuli at others (Aseem Mishra et al., 2015). Ignoring these facts, cigarette smokers use to smoke the cigarette. After smoking, cigarette butts thrown away in open environment and this may cause nausea or even at one end solid waste and or toxic pollution.

The thrown cigarette butts have some quantity of tobacco, synthetic filters and wrappers. Amongst these synthetic filters of cigarette butts could be managed. Kasar et.al. (2020) has proved that, the synthetic filter could replace natural cotton in wick preparation and hence production for lightening the lamp.

However, the tobacco and wrapper waste of cigarette butts have to manage carefully because nicotine in the tobacco waste can kill soil organisms and insects if it gets concentrated in one spot. Also, it can harbour diseases that can pass to related crops like tomatoes, potatoes, peppers and eggplant (Ai-dong Ruan et al., 2015).Similarly, Cigarettes and tobacco products contain Tobacco Mosaic Virus (TMV). This severely stunts the plant growth and reduces crop yields. Thus, TMV stands a serious threat to plants (Creager et al., 1999).The wrapper of cigarette which covers the filter and tobacco of cigarette is not found toxic but can reduce aesthetic beauty of places where they disposed. Hence, it is necessary to manage tobacco and wrappers waste which is generated by cigarette butts .At global level approximately 4.5 trillion cigarette butts (765400 ton) generated every year and it is estimated that it can produce 26661.20 ton tobacco and 82776.29 ton wrappers in same period (Kasar et al., 2020).

Therefore in present investigation an attempt has been made to manage the tobacco along with wrappers of butts using composting technique. As composting is the process converts decomposable matter into stable products like N, P and K which is essential elements of biogeochemical cycle for sustainable development.

II. MATERIAL AND METHODS

II. a) Collection, Operation and Separation of butts: Thrown away cigarette butts of different brands (such as Marlboro, Gold Flake, Gold Flake Light, Double Burst, Bristol etc.) having different diameter, length and weight was collected manually from places like Bus depot, Cinema halls, Hotels, etc. The collected butts were brought to laboratory and weighed on balance. Weighted butts were operated, separated and weighted separately for synthetic cotton i.e. filters tobacco and wrappers (Photo 1 to 4 and Table 1).



Photo 1: Showing collected Cigarette Butts.



Photo 2: Showing separated filters.



Photo 3: Showing separated Wrappers.



Photo 4: Showing separated Tobacco.

Table 1: Showing the weight of different parts of cigarette butts after separation.

Weight of collected cigarette butts	Weight of Waste Tobacco	Weight of Wrappers	Weight of Synthetic filters
500gm	31.6gm	98.11gm	370.29gm

II. b) Preparation of sample for Compost: The separated 31.6gm of waste tobacco was placed in sufficient quantity of water, as nicotine is readily soluble in water and having ability to act as acceptor for hydrogen bonds to water. This water along with tobacco was boiled for few minutes to dissolve and volatize the nicotine. Thus nicotine and toxic substances removed from tobacco (Claffey et.al., 1950). Then remaining tobacco (25.69gm) after filter and drying along with wrappers (98.11gm) were mixed with substrate i.e. cow dung (300gm) and dry maize leaves (300gm) to enhance the composting. Before mixing the NPK content of tobacco, wrappers and substrate was analyzed separately (Table 2) by suitable method given by Trivedy and Goel, 1984.

II. c) Set of Compost: The whole mixture was then kept by maintaining 35% moisture for 30 days to compost. After 30 days, the compost obtained (Photo 5) was analysed for Nitrogen, Phosphorous and Potassium content as earlier methods. The results obtained are presented in Table 2 and Figure 1.

Table 2: Showing the Nitrogen, Phosphorous and Potassium content in substrate and in compost.

Parameters	Substrate		Tobacco waste Before Compost	Wrapper waste Before Compost	Compost after 30 days
	Cow Dung	Dry maize Leaves			
Nitrogen	3%	2.25-3.30%	2.5%	1%	3.50%
Phosphorous	2%	9-14%	0.17-0.5%	1%	12.60%
Potassium	1%	1-3%	1.6-3%	0%	1.46%



Photo 5: Showing prepared compost

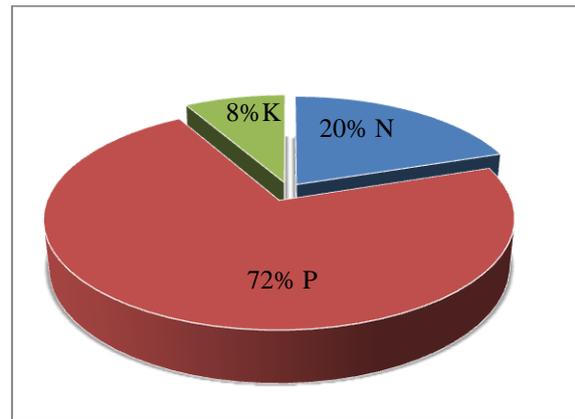


Figure 1: Showing % of N-P-K of Compost after 30 days

III. RESULT AND DISCUSSION

It is observed from table 1 that, when 500 gm cigarette butts separated, it shows 31.6gm tobacco, 98.11gm wrappers and 370.29 gm filters respectively. From these, filters could be managed for wick preparation (Kasar et al., 2020). However, while making tobacco waste and wrappers management with substrate for composting, table 2 shows that, compost (Photo 5) after 30 days has **Nitrogen (N)** up to **3.5%**. It is very important primary nutrient for plant growth but also stand as a major component for produce sugars during photosynthesis. Similarly, it helps to build the block of proteins in the plants for survival. (Leghari et al., 2016). Therefore compost may increase nitrogen level in soil which will help to increase soil quality.

Table 2 also shows that, the compost after 30 days shows **12.6%** of **Phosphorous (P)**, which is more as compared to substrate. The increase in phosphorous content in compost may be due to cow dung and maize leaves supplies extra phosphorous in compost through phosphate solubilizing bacteria (Rodriguez et al. 1999). This content of phosphorous might help in metabolic process like photosynthesis, energy transfer and synthesis as well as breakdown of carbohydrates. Thus, deficiency of phosphorous in plant and soil can be recovered with the help of compost along with tobacco and wrapper waste and substrate. This may help to increase soil quality, stimulate root development, increase stalk and stem strength, improve flower formation, seed production, increase resistant to plant disease, support development throughout entire life cycle (Asher et al., 1967).

The **Potassium (K)**, which is essential for plant growth, has a unique function for enzyme system which control metabolic reactions, particularly in the synthesis of protein and starches (Amtmann et al., 2005). The compost which is rich in **Potassium** i.e. **1.46%** (Table 2) may become a source of potassium to soil as well as plant growth and development when used.

Figure 1 also shows that the compost after 30 days shows N (20) P (72) and K (8) percent respectively at glance during the study.

IV. CONCLUSION

It was observed that the compost of tobacco waste and wrappers along with substrate showing high value of N, P and K. As, it was estimated that, 4.5 trillion (756400 ton) cigarette butts produces 26661.20 ton waste tobacco and 82776.29 ton of wrappers every year. Therefore the management of this tobacco and wrapper of cigarette butts could help to minimize harmful impact on environment. Also the high value of N, P and K can be useful to improve the soil quality

and plant growth and development. Hence, the commercialization and preparation/production of compost from waste tobacco and wrappers may be possible in future for sustainable plant growth and soil development.

REFERENCES

- [1] Ai-dong Ruan, Chen-Xian Liu (2015) Analysis of effect of Nicotine on Microbial community structure in sediment using PCR-DGGE fingerprinting. *Journal of Water Science and Engineering*. Vol.8, No.4, pp: 309-314.
- [2] AmirrezaTalaiekhosani, Ali Mohammad Amani (2018) Preparing emission factor of carbon dioxide, carbon monoxide, hydrocarbons and nitrogen oxides for cigarette. *Journal of a Air Pollution and Health*. Vol.3 (4), pp: 219-224.
- [3] Amtmann A, Hammond JP, Armengand P, White PJ (2005) Nutrient sensing and signaling in plants: Potassium and Phosphorous. *Advances in Botanical Researches*. Vol.43, No.5, pp: 209-257.
- [4] Angela NH Creager, KBG Scholthof, Vitaly G tovsky, Herman B Schithof (1999) Tobacco Mosaic Virus: Pioneering Research for a century. *Journal of The Plant Cell*. Vol.11, No.3, pp: 301-308.
- [5] Aseem Mishra, PankajChaturvedi, SauravDutta, SnitaSinkumar, Poonam Joshi, and ApurvaGarg (2015). Harmful effects of Nicotine. *Indian Journal of Medical and Paediatric Oncology*. Vol.36 (1), pp: 24-31.
- [6] Asher C, Loneragan J (1967) Response of plant to phosphate concentration in solution culture: Growth and phosphorous content. *Journal of soil science*. Vol.103, Issue-4, pp: 225-233.
- [7] Claffey, J.B. C.O.Badgett, J.J.Skalamera and G.W.Macpherson Philip (1950). Nicotine Extraction from Water with Kerosine. *Journal of Industrial and Engineering Chemistry*. Vol.42, No.1, pp: 166-171.
- [8] Hilda Rodriguez and ReinaldoFraga Vidal (1999) Phosphate solubilizing bacteria and their role in plant growth promotion. *Biotechnology Advances*. Vol.17 (4-5), pp: 319-339.
- [9] Kasar S.R, Naikwadi GB, Talole RS and Pondhe GM (2020) To study the Management and Reuse of thrown Cigarette Butts i.e filter: A Case Study. *International Multidisciplinary E-Research Journal*. ISSN: 2348-7143. Special Issue-218, pp: 27-29.
- [10] Laura M Juliano, Lisa M Fucito and Paul T Harrel (2011) The influence of Nicotine dose and nicotine dose expectancy on the cognitive and subjective effects of cigarette smoking. *Journal of Experimental and Clinical Psychopharmacology*. Vol.19, No.2, pp: 105-115.
- [11] Leatherdale S.T., R Ahmed, A Barisic, D Murnaghan and S Manske, (2009) Cigarette brand preferences as function of price among smoking youths in Canada: are they smoking premium, discount or native brands. *Journal of Tobacco Control*. Vol.18, No.6, pp: 466-473.
- [12] Rabinoff, Michael; Caskey, Nicholas; Rissling, Anthony; Park, Candice (2007) Pharmacological and chemical effects of cigarette additives. *American journal of public health*. Vol.97 (11): 1981–1991.
- [13] Shah JahanLeghari, Niaz Ahmed Wahocho, Ghulam Mustafa Laghari, Abdul HafeezLaghari (2016) Role of Nitrogen for Plant Growth and Development: A review. *Journal of Advances in Environmental Biology*. Vol.10, No.9, pp: 209-218.
- [14] Susan Solomon, Gian-Kasper Plattner, RetoKnutti and Pierre Friedlingstein (2009) Irreversible Climate Change Due to Carbon Dioxide Emissions. *Proceedings of the National Academy of Science*. Vol.106, No.6, pp: 1704-1709.
- [15] Trivedy R. K and Goel P. K., (1986) Chemical and biological methods for water pollution studies, Environmental publication, Karad, 251p.