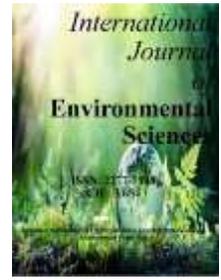


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**Review Paper****Review on Recycling Used Cigarette Butts****Pali Sahu**

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ARTICLE INFORMATION

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ABSTRACT

The most prevalent sort of trash on planet is cigarette butts. We are practically surrounded by this rubbish. Water readily leaches the harmful compounds from the butts of used cigarettes that have been absorbed by cellulose acetate filters and detected in the remaining tobacco. The collecting, cleaning, recycling, and reuse of cigarette filters or butts are the main topics of this study. We advise turning wasted cigarette butts into a useful product. The non-biodegradable cigarette filters have an impact on water bodies and discharge toxins into the deposited soil. Therefore, we advise putting the butts to reuse in order to guarantee proper disposal.

Introduction

Considering the current environmental status of our country, India, strict measures must be taken to fight back the pollution crisis. One of the sources of pollution is cigarette litter and we must address it as a litter too. Even as the smoking rate has gone down, cigarette butts seem to be everywhere, scattered along green spaces, sidewalks, roadsides, beaches, waterways—virtually everywhere we go [1]. We plan to recycle used cigarette butts into an efficient yet economical material that can be welcomed by the construction industry.

**Fig.1** Butts trapped inside a trunk of a tree.**Fig.2-** Saturation of butt litter.

Cigarettes are made from four components, each of which is described below.

1. Filters
2. Tobacco
3. Additives
4. Cigarette wrapper

Filters: A cigarette filter, also known as a filter tip, is a component of a cigarette, along with cigarette paper, capsules and adhesives. The filter may be made from cellulose acetate fiber, paper or activated charcoal (either as a cavity filter or embedded into the cellulose acetate). Macro porous phenol-formaldehyde resins and asbestos have also been used in cigarette filters. The acetate and paper modify the particulate smoke phase by particle retention (filtration), and finely divided carbon modifies the gaseous phase (adsorption). Filters can reduce "tar" and nicotine smoke yields up to 50%, with a greater removal rate for other classes of compounds (e.g., phenols), but are ineffective in filtering toxins such as carbon monoxide.



Fig.3- Dissected cigarette before and after smoking.

Cellulose acetate fiber: It may look like cotton, but 98 percent of cigarette filters are made of plastic fibers (cellulose acetate) that are tightly packed together, which leads to an estimated 1.69 billion pounds of cigarette butts winding up as toxic trash each year.

Non-biodegradable: The plastic fibers in cigarettes are non-biodegradable, meaning they won't organically break down from living organisms. The plastic, cellulose acetate, only degrades under severe biological circumstances, such as when filters collect in sewage.

Life Span: Although cigarettes don't break down naturally, they can gradually decompose depending on environmental conditions like the rain and sun. Estimates on the time it takes vary, but a recent study found that a cigarette butt was only about 38 percent decomposed after two years. A normal life span of a discarded filter is thought to be up to 15 years.

Reportedly, world's the most troubled litter: Worldwide, about 4.5 trillion cigarettes are littered each year [2, 3].

Objective of the study is to reduce or reuse cigarette butt waste as it contains huge amount of tar and very much toxic for all globe. The current study focused on various ways to purify and reuse toxic cigarette butt to save our planet.

Statement of the Problem:

Imprudent actions of the smokers and extravagant approach of the Government reflects the Unawareness of the severity of the issue; Inadequate ways of disposal and absence of segregation of used cigarette butts are intoxicating the entire garbage; Seldom research, on the effects and application, has granted only handful of organizations around the world, while only one company in India, to make an effort to bring the change; Economic yet efficient cost analysis for the collection, recycling and reuse of the used cigarette butts must be audited for conducting implementation.

Numerous research papers and studies have been carried out but a solid implementation is yet to be derived. Seldom research carried out so far, fails to provide an adequate answer to the litter issue.

Need of topic:

The recycled used cigarette butts can also be studied for combining in concrete products. They can be used as a binder in advanced pre casting blocks, tiles, roofing sheets, etc. One must study the material in discussion as thoroughly as possible to understand the characteristics that it offers; it's working under different scenarios such as compression, tension, fire, thermal insulation etc. If observed, that the material withstands heavy wear and tear, extreme weather conditions and if can be molded as per the requirements, the recycling of Cigarette filters would offer a lot of possibilities and applications in construction industry.

Goal:

Preserving our water sources; Protecting wild life; Enriching our environment by eliminating one of the most toxic solid wastes; Revenue and job generation.

Limitations:

The used cigarette butts need to be cleaned not just physically but should be free from any harmful chemicals present in cigarette tar; The people are yet to be made completely aware about the growing litter around them which is more toxic than any of the other garbage or household wastes around us; Immense man power is necessary to bring the significant change regarding the disorderly situation.

Literature review

M. Hengstberger and M. Stark, in year 2009 stated that risk is generated due to released fibers and particles. The fibers of diameter 20-32 micrometer were identified as Cellulose Acetate fibers from cigarette filters. The overall conclusion was that fibrous matter was not transferred into the air during smoking and was not of a size to be respirable.

Thomas E. Novotny et.al in year 2009 stated that in a review by the US public Health service concluded that, the preponderance of scientific evidence strongly suggests that the lower the tar and nicotine less harmful will be the effects. In a review of litter cleanup project reports, the keep America Beautiful Campaign reported that cigarette butts comprise from 25 to 50 percent of all collected litter items from roadways and streets.

Germa A. Miretti et.al. In year 2010 stated that the environment and building quality as social demand eco- companionable material are always an excellent solution to solve acoustic and thermal building insulation problems. Acoustic are also to reduce the energy of sound wave when they are reflected from walls as well as during their free propagation many different methods to determine the acoustic properties.

Richard M. Gersberg et.al. In year 2011 stated hazardous effects of cigarette litter, assessing the potential ecological risks of cigarette butts to the aquatic environment. Smoked cigarette butts, smoked cigarette filters and un-smoked cigarette filters were all found to be acutely toxic to representative marine and freshwater fish. Remnant tobacco was found to contribute a degree of toxicity.

Cheryl G. Heaton stated that cigarette butts contain all the carcinogenic chemicals, pesticides and nicotine that make tobacco use the leading cause of preventable death worldwide, yet they are commonly unconsciously and inexcusably dumped by trillions into the global environment each year. Cigarette butt waste is the last socially acceptable form of littering in what has become increasingly health and environmentally conscious world.

Elli Slaughter et.al in suggests the extreme actions of banning and the sale of filtered cigarettes also to hold tobacco companies responsible for cleaning the litter. This paper also recommends several policy approaches to mitigation of this ubiquitous environmental blight.

The paper by Tobacco control legal consortium, California proposed policies to reduce or eliminate the public health and environmental effects of cigarette butt waste have focused on two discrete methods namely making cigarette butt waste less toxic and Reducing number of cigarette waste, municipalities have adopted several different policies, including mitigation fees, deposit and refund policies, biodegradable filters or unfiltered cigarettes, product stewardship, filter recycling and smoke-free laws.

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Rashmin Kulkarni et.al. in year 2018 stated that the water absorption increased with the increase in percentage of cigarette butts to avoided by water repellent admixtures as well as by maintaining the appropriate water cement ratio. Cigarette butts can be used in less percentage by weight of the mix proportion to get good quality of paver blocks which will also help us to reduce the world's cigarettes butt problem. the compressive strength can also increase by maintaining the correct water-cement ratio. Plasticizers and other such admixtures can be used to achieve high early strength of block for paving.

Case study

A used cigarette butt mostly contains tobacco remnant, ash, paper and filter. It has already been studied that except for the filter the rest of the three materials are bio-degradable. Thus the paper, tobacco, and ash are used to produce organic manure. The 'CODE'; A Noida-based Company is recycling cigarette waste right from the paper and filter to ash and tobacco. Started by two friends in their twenties, the company is fighting a huge environmental hazard. In July 2016, they launched Code – a company that offers a one-stop recycling solution for cigarette waste.

They regularly collect waste from their customers and recycle every component of the remaining cigarette. And the best part is that customers can earn some money in return for just collecting and handing over cigarette waste to them. Code pays Rs 700 for every kilogram of cigarette waste, and Rs 80 for every 100 grams. Customers include people who smoke as well as those who sell cigarettes.

Ongoing research areas

A group of researchers has proposed adding tablets of food grade acid inside the filters. Once wet enough the tablets will

release acid that accelerates degradation to around two weeks (instead of using cellulose triacetate and besides of cigarette smoke being quite acidic).



Fig.4- Founders of the Code Company.



Fig.5- Vendors benefitting by the collection of litter.

A Dutch start-up is training crows to recognize and pick up cigarette butts in exchange for treats.

The next option is using cigarette packs with a compartment for discarded cigarette butts, implementing monetary deposits on filters, increasing the availability of butt receptacles, and expanding public education.

Recent research has been put into finding ways to utilize the filter waste, to develop a desired product. One research group in South Korea have developed a simple one-step process that converts the cellulose acetate in discarded cigarette filters into a high-performing material that could be integrated into computers, handheld devices, electrical vehicle and wind turbines to store energy. These materials have demonstrated superior performance as compared to commercially available carbon, graphene and carbon nano tubes. The product is showing high promise as a green alternative for the waste problem.

Conclusion

Immediate implementations of the measures discussed in this paper are necessary considering the growing adverse effects on nature. When the used cigarette butts would be recycled, we act to eliminate major waste component from the world. By recycling the non-biodegradable filters, we can avoid our lands and rivers to turn toxic and save lives. At present due to the unawareness and ignorance amongst people, this issue would cost us and our future generations as well hence we must act obligingly. Intensifying the bars of,

“Best from waste” ideas by provoking the youth of our country to take steps against the depleting environmental conditions. By eliminating worlds, the most troubled litter from our nation, we would signify that our country India is on a developing stage and soon will be a developed nation throughout.

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