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Waterless Portable Composting Toilet

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Abstract: *The current scenario is that, if there is possibility of third war it is due to water only. The day by day population is increase rapidly. The water source on earth is limited. So there is imbalance in water and its demand. The today most important challenge for world is to meet water demand. As water is life, all human activity is dependent on water. In current paper the attempt is made to overcome water scarcity problem. In Maharashtra in some region there is flood during rainy season but on opposite side there is draught. The reason is both natural and manmade activity. In current work the prototype model of waterless toilet is made, such that it is having some advantages like less or no water, production of valuable manure. The utility of this waterless portable composting toilet is it can be used at any place and can be carried over from one place to another. It requires very small space and can be variedly used at home. It can be utilized by richest section as well as poorest section .As 48% of Indian population defecates in open these toilets are very economical and can be used on large scale. These types of toilet also do not harm the environment and helps in sustainable development which is the need of today's generation.*

Keywords: *Waterless toilet, decomposition, Rise husk, Saw dust, Temperature.*

I. INTRODUCTION

As we know water has become an important asset in those days. Many parts of world is suffering from severe scarcity of water currently people are not getting water from irrigation purpose, even many places are there where even people are suffering for drinking water. All this perhaps become of continuous use of water for various purposes like irrigation, household and mainly industrial. Additional load is imparted on water balance due to increasing population. If we see the usage of water for flushing about 25 lit. Waste per person is use. So need of alternate system is must be eliminate this usage. For proper functioning of ecosystem and ecology the give and take cycle must go in proper way without any ruin. In the current system the waste generated from human is either destroyed or discharge in water bodies. This may harm aquatic life and also cut breakdown the nutrient cycle which lids to imbalance in nature. Also lots of luxuries and facilities have been developed in each and every field. Also many innovation and modernization have made every work so that a user's love to do then irrespective of locality (location i.e. rural or urban). But the only space which has been remain undiscovered in this sector is "TOILET" no such achievement have been seen in the field of toilet system. This is also one of reason why the people in most parts are not habitual to toilet and prefers to defecate openly. Various facilities must be made available is a toilet box or compartment which will change the perception of users towards it. Actually the toilet system must be change from a burden or compulsion to matter of interest or entertainment i.e. which will entertain people and will satisfy dual objective to make country defecation free and will strongly support "SWACH BHARAT MISSION" as well. The utility of this waterless portable composting toilet is it can be used at any place and can be carried over from one place to another. It requires very small space and can be variedly used at home. It can be utilized by richest section as well as poorest section .As 48% of Indian population defecates in open these toilets are very economical and can be used on large scale. These types of toilet also do not harm the environment and helps in sustainable development which is the need of today's generation. It has become increasingly obvious that the amount of available fresh water is decreasing at an unsustainable rate. Much of this is a result of overuse, at one end of the spectrum, and pollution, at the other end. In India the average person uses 135 litres of water per day. While the breakdown tends to show agriculture and increased consumption as the biggest users of water, domestic use is still large and within the home the toilet tends to the most water consumptive feature, which would make sense, since in India our water-borne sanitation system is taken for granted. Each home is equipped with at least one flush toilet. Every human being uses the restroom, and for a healthy adult, these means three bowel movements and between five to seven urinations each day. This is "waste" that is typically flushed down the toilet and never thought of again.

II. LITERATURE STUDY

Henry Moule in 1860 invented the first ever dry toilet called the earth commode made of wood. This paper summarizes the theory and practice of Composting Toilet. The flush mechanism of this toilet released soil into commode ever time the flush was used. The

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closet was shallow allowing aerobic decomposition.

Appasaheb patvardhan & Patil in Year 1998 invented a double chambered composting toilet in India. In his paper he mentioned that Night soil is collected and composted and applied to crops. There was very little use of water in this toilet. Use of two chambered toilets with aeration chimneys was also seen in Vietnam in 1960.

Crockett, in 2000 assessed the feasibility of using composting toilets in a dense urban environment with grey water discharged to sewer and concluded that, for an unsewered city, there is a potential economic advantage over conventional sewerage as well as environmental benefits, particularly where nutrient had to be removed from sewerage prior to discharge.

Johansson in 2001 reported on a major collaborative research project conducted in Sweden in 1996 on the use of urine separating toilets in two residential estates, both a few kilometers south of central Stockholm), Understenshöjden (44 apartments) and Palsternackan (51 rented apartments). Both used toilet bowls with a front urine collection section came onto the market around 1993), water trap and storage tank for separated urine. Faecal matter and grey water was discharged in one case to an on-site septic tank based system and in the other case, to sewer. Urine was tinkered from on-site storage tanks to plastic tanks at an agricultural site near Lake Bornsjön in Salem.

III. MATERIALS & METHODS

A. Data collection

The prototype model is made in laboratory. The locally available material is used in model making. Plastic FRP material is used for model. PVC 10 lit can is used to store urine. Steel rod is made such that it used as paddle. The rise husk and saw dust is used as filler material in tank. The waste is dried naturally. In rainy season there may be less temperature so at that time it is proposed to have heater to have proper temperature. The startup is given by using cow dung as raw material.



Fig.1 Schematic Dia. of Waterless Toilet

B. Design Requirements of Composting Toilet

Environmental factors affect the decomposition process such as follows

Sufficient oxygen is necessary for aerobic composting

Moisture content from 45 to 70 percent (heuristically, "the compost should feel damp to the touch, with only a drop or two of water expelled when tightly squeezed in the hand.

Temperature between 40 and 50 °C (achieved through proper chamber dimensioning and possibly active mixing)

Carbon-to-nitrogen ratio (C: N) of 25:1

The factors affecting the process of composting include water content, temperature, carbon to nitrogen ratio, pH, particle size, porosity, oxygen concentration. These parameters depend on the formulation of the compost mix. During composting, how the process is managed by agent addition, aeration, mixing, heating, and leachate collection will affect the water content, temperature, and oxygen concentration of the compost. Most of these factors affecting composting are inter-related. Generally, composting systems do not have any monitors to check the condition of the compost.

C. Dimensions of fabricated model:

Size of Urine Chamber: 20cm*16cm*28cm

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Volume of Urine Chamber: 10lit

Size of Night Soil Collecting Chamber: 44.5cm*35.5cm*43cm

Volume of Night Soil Collecting Chamber: 67929.25cm³

Ventilation Pipe Diameter: 2cm

Night Soil Collecting Duct Diameter: 15cm

Urine Diversion Holes Diameter: 1.5cm Each

Total Width &Length of Commode: 42cm*66cm

Material Used In Commode and Collecting Chamber for Construction: Plaster of Paris (POP) and Fiber Sheets

Electrical Fan: 80mm Dia and 12V it is required at the time of winter (optional)

Material used for decomposition of feases: Saw dust and coconut coir

No of family members used: 2 adults and 2 children

D. Working of Model

The purpose of this section is to present information developed during preliminary design of the demonstration project. It describes the issues and possible design solutions for a dry composting toilet installation in the high density residential development, which is the proposed site of the demonstration

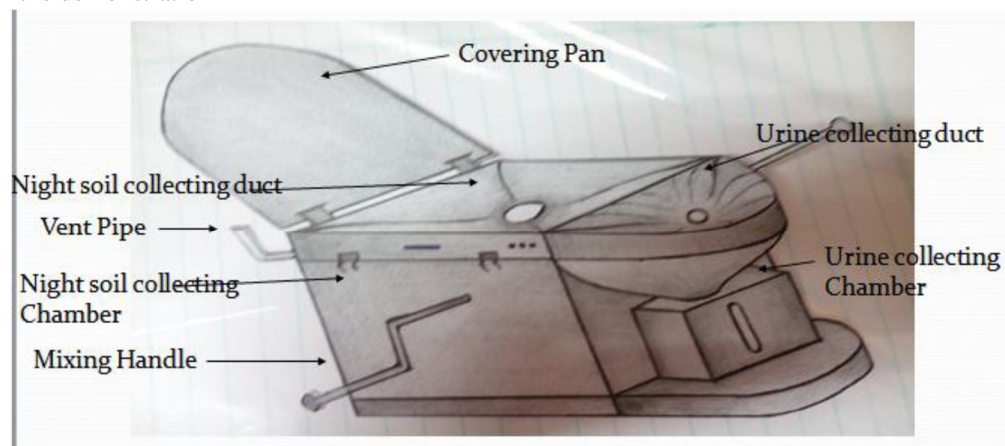


Fig.2 working of model

E. Detailed working of Model:

Before the present process and apparatus enablement are described, it is to be understood that this invention is not limited to the particular device and process described, as there can be multiple possible embodiments of the present invention which are not expressly illustrated in the present disclosure. It is also to be understood that the terminology used in the description is for the purpose of describing the particular versions or embodiments only, and is not intended to limit the scope of the present invention. Present invention also not limit the use of waterless portable composting toilet/toilet but also covers all related applications



Fig.3 Actual Setup

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IV. DISCUSSION

A. The Benefits of Urine as a Fertilizer

There are many reasons that urine works so well as a fertilizer. Human urine contains very few, if any, pathogens but contains the majority of plant fertilizing nutrients. This high nutrient, low pathogen combination means that urine can be used very easily and safely to increase the yields of food crops. Add to this the ease and low cost of separating urine in most developing world sanitation systems and it is easy to see why the use of urine fertilizer could mean very real benefits for farmers and families with small gardens.

B. Cost & Economy

The costing of this toilet is 5000/- whereas conventional flushing toilet like Kohler and hardware cost about 16000-18000/- . Thus this waterless portable composting toilet is very economical and can be used by poorest section of society. Government gives 12000/- subsidy on each toilet in rural places but this toilet can be an excellent option.

Sr No	Major Components	Cost in rs
1	Composting Chamber	1650/-
2	Toilet Seat	1925/-
3	Electronic Setup(during winter)	1500/-
4	Total Cost(Approx.)	5000/-

V. CONCLUSION

Water scarcity issues are only just beginning to have an impact on the way we live our daily lives, and the way we navigate the world and our place in it. In a very alarming way also, pollution has crept up in almost every part of the world to remind us of how interconnected everything really is. Climate change is now pressuring our environment, our economy and us to adapt to more conscious way of living and interacting.

While this does not mean we have to throw everything we have known out the door, it does mean we need to continue down the path of innovation and ingenuity, but with a heightened awareness of our actions and their consequences from start to finish. The assessment of the waterless toilet has helped to understand the advantages of waterless toilet and the health risk associated with the implementation if not properly managed. It has assisted in determining the perception of users towards the toilet and various measures to be implemented in improvement willingness to use the toilets. It has also provided information for further research work as regards the challenges users face when using the waterless toilet. With improvement in the sanitation and hygiene condition of the toilet facility, more users will be comfortable to use the toilet without the fear of catching germs from the toilet

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