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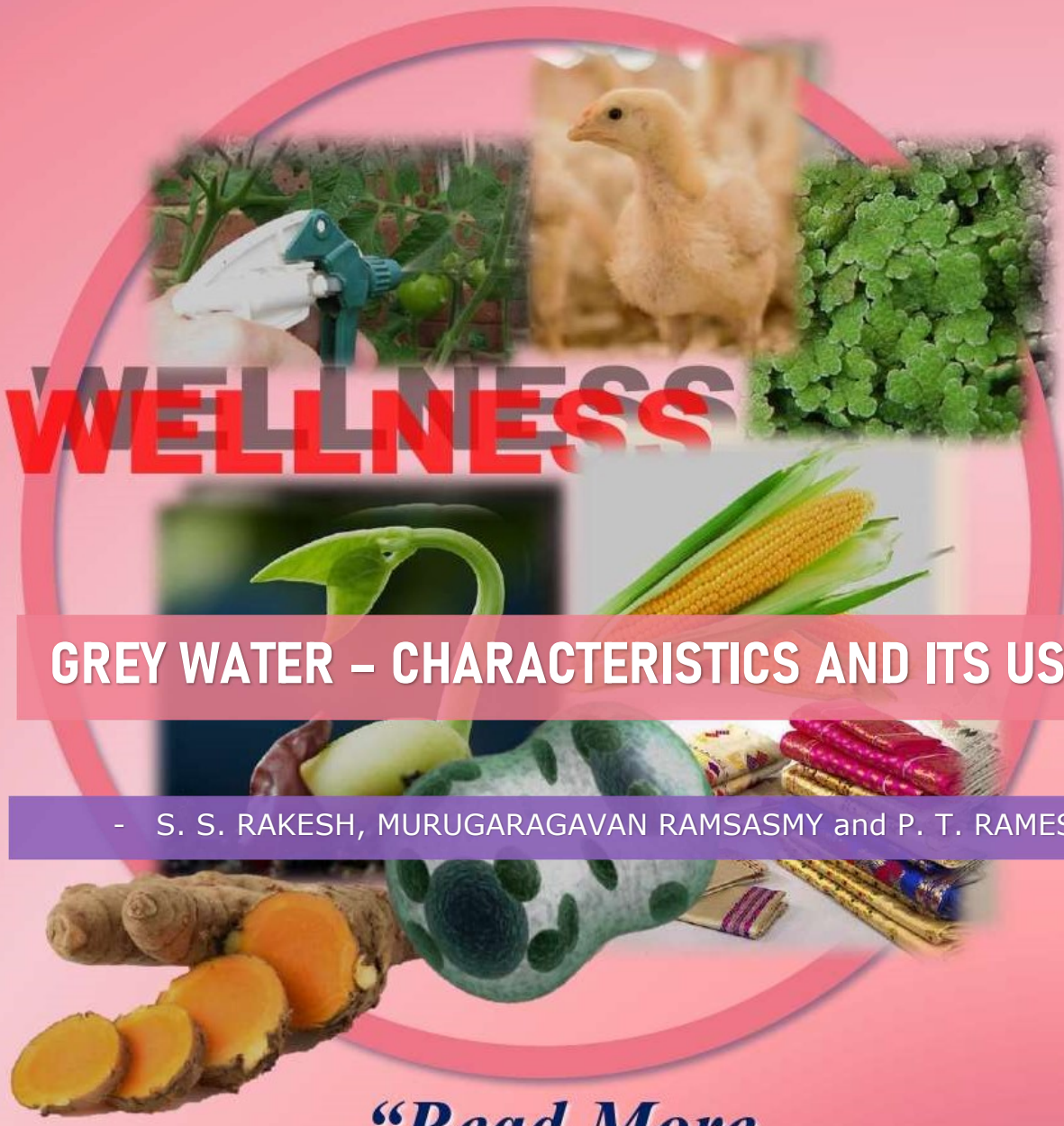

WELLNESS

GREY WATER – CHARACTERISTICS AND ITS USES

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GREY WATER – CHARACTERISTICS AND ITS USES

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ABSTRACT

Greywater accounts for 50 - 80 % of domestic wastewater, with per capita generation estimated at 110 lpcd (litre per capita per day) in India, out of which 80 lpcd is contributed from bathing, washing cloths and wash basins. Reuse of greywater reduces the quantum of freshwater consumption, prevents contaminant addition to soil and water besides decreasing the cost of water. Greywater recycling in India has not achieved significant momentum despite the Government of India making mandatory regulation in large residential complexes for treating and reusing grey water. The uses of greywater in household, schools, government office, hospital, theatre, mandapams, hotel, airport, railway station, bus stations, apartments and colony for toilet flushing, floor cleaning, irrigation, gardening, car washing, constructions etc., to save water by adopting the utilization of treated greywater for the above said purposes to meet out the needs of water requirement for the present population.

Key words: Greywater, Oil, Greases, flushing, households, irrigation

INTRODUCTION:

Wastewater generated from households is categorized in to two types, greywater and black water, greywater constituting the largest flow. Greywater refers to the household wastewater generated from showers, washing machines and bathroom sinks excluding toilet wastes and that it has low pathogenic and organic contaminants (WHO, 2006). Lazarova et al., (2003) estimated that greywater from residential apartment accounts for 50 - 70% of wastewater generated.

GREYWATER:

Grey water, water that is generated from domestic sector through dishwashing, kitchen sinks, laundry machines, showers and bathroom sinks constitute the largest amount of wastewater from households (Birks and Hills, 2007). While it includes water from bathroom sink (light grey water) and laundry machines (dark grey water), it excludes water from toilets (black water). Greywater accounts for 50 - 80 % of domestic wastewater, with per capita generation estimated at 110 lpcd (litre per capita per day) in India, out of which 80 lpcd is contributed from bathing, washing cloths and wash basins. The remaining 30 lpcd is contributed from kitchen (Rina et al., 2016). Grey water, in general, is biologically less polluted

compared to black water as it does not include faeces. However, the presence of oils and surfactants, bacteria, viruses and some dissolved salts prevents its direct use for any purpose. Reuse of greywater without any pre-treatment could transmit diseases, negatively impact soil, and pollute groundwater and surface water. Therefore, treatment of the greywater is indispensable before reusing it. Reuse of greywater reduces the quantum of freshwater consumption, prevents contaminant addition to soil and water besides decreasing the cost of water. Greywater recycling in India has not achieved significant momentum despite the Government of India making mandatory regulation in large residential complexes for treating and reusing grey water. High economic costs, dependency on waste water engineers, technical snags associated with high end treatment devices and lackluster environmental responsibility are some reasons that failed to take greywater recycling across Indian cities. With increasing urban population and struggling with decreasing per capita water availability, greywater reuse in households itself could bridge the gap between sufficiency and deficiency of water

CHARACTERITICS OF GREYWATER

The composition of greywater varies greatly according to its origin (i.e., bathroom, laundry or kitchen greywater) and is influenced by the water quality of the locality. A variety of contaminants including acidic and alkaline substances, suspended and dissolved solids, fats, oil and grease, heavy metals, synthetic chemicals and pathogenic organisms are likely to be present in greywater. Roeleveld and Zeeman (2006) reported that the organic fractions in greywater is around 30%, while the nutrient fraction constitute 9 – 20 per cent.

1. pH:

The pH in grey water is directly related to certain chemicals such as fabric softeners, bleaching agents and disinfectants. In general, wide variation in pH, ranging from 6.4 to 8.1 was reported in greywater by many researchers.

2. Electrical conductivity:

The conductivity values ranging from 0.52 – 1.27 dSm-1 in greywater. Higher values of upto 4.7 dSm-1 was mainly due to differential discharge of laundry, kitchen and floor washings at differential times.

3. Solids in greywater:

The solid content of greywater in generally low, indicating that a large portion of the contaminants in dissolved form . Suspended solid content varying from 15 mg L-1to 800 mg L-1. The source of suspended solids is body care products, toothpaste, shaving waste, skin, hair, body fats and food particles and fibres from various textiles. Dissolved solids constitute an important fraction of greywater. The TDS values of 712 mg L-1 to 990 mg L-1 in greywater that was collected from Chennai.

4. Biological oxygen demand:

Biological Oxygen Demand (BOD) refers to the oxygen requirement in the greywater for microbial breakdown of organic compounds at a constant temperature. The BOD in the greywater has very wider variations (5 mg L -1 to 431 mg L-1). The main contributor to BOD in greywater is the dissolved organics and suspended food particles.

5. Chemical oxygen demand:

The COD values of 4800 mg L−1 in commercial laundry greywater. The COD:BOD ratio around 4:1 in greywater. Normally the COD values ranging from 254 mg L-1 to 618 mg L-1 in greywater.

6. Coliforms:

The coliforms represent the faecal contamination in the water. The fecal contamination of greywater is a common occurrence, creating the risk of a range of fecally transmitted pathogens. Coliform populations of 3 × 103 to 2.4 ×107 CFU per 100 ml. The fecal Enterococci were found in at least 70% of greywater tested. Occurrence of other pathogenic bacteria, was also reported in greywater especially, the skin pathogen (Pseudomonas aeruginosa), respiratory pathogen (Legionella pneumophila) and enteric pathogen (Escherichia coli) in greywater. Not only bacterial pathogens, but the pathogenic protozoan, Cryptosporidium sp. Etc., enteric pathogenic bacteria, such as Salmonella and Campylobacter, can be introduced by food handling in the kitchen in addition to that from the fecally derived matter.

7. Fats, oil and grease:

The oil and grease is another important parameter in greywater as kitchen sinks and bathroom showers contribute to this pollutant. The concentration of oil and grease in an untreated domestic wastewater was 50 mg L-1 to 100 mg L-1.

8. Other compounds:

Heavy metals, xenobiotic compounds, nitrates, phosphates, quaternary ammonium compounds (QUATS) were found in greywater . Most of these originate from body lotions, hair dyes and make-up materials. The presence of these compounds could harm ecosystems if not properly treated and disposed.

USES OF GREYWATER

The treated greywater may be used for many purposes and the uses were as follows

1. Irrigation of landscape, tree crops , arid and semi arid regions
2. Gardening, plantations and floor washings
3. Toilet flushing , cooling and construction works
4. Possibility of utilizing greywater in air conditioning system
5. Industries-feeding of water to boilers(In industry, treated gray water is mostly used in cooling tower)
6. Recycling of greywater satisfy 50% of water demand in domestic uses
7. It can be used for ground recharging
8. The uses of greywater in household, schools, government office, hospital, theatre, mandapams, hotel, airport, railway station, bus stations, apartments and colony for toilet flushing, floor cleaning, irrigation, gardening, car washing, constructions etc.,
9. The reuse of gray water for toilet flushing alone could reduce the fresh water demand by 10 – 20% . And the reuse of gray water for toilet flushing and garden irrigation could reduce the total domestic water consumption by up to 50% . At the same time gray water reuse must be environment friendly without

causing any public health hazard. But there are no laws and regulations on the treatment and reuse of gray water in many developing countries including India

10. The treated greywater can be supplied for irrigation of indoor plants as the greywater is most suitable for this purpose. However, the application must meet the stringent requirements form possible exposures to greywater. The treated greywater can also be used for irrigating agricultural crops and turfs and for maintaining decorative fountains or landscapes impoundments.

CONCLUSION

The wastewater(grey water) generated from domestic area's must be treated and utilized for various purposes especially not-potable purposes viz., flushing toilets, floor cleaning , irrigation for landscapes and gardening etc., due to the unavailability of groundwater to fulfill the needs of increased populations. In this way to recharge the groundwater effectively by applying complex and applicable way of resource exploitation and conserve the loss of water for future in the ecosystem.

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