Journal of Environmental Health and Sustainable Development

Greywater, a New Alternative Approach for Domestic Wastewater Separation and Reuse in Iran

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ARTICLE INFO

LETTER TO EDITOR

Article History:
Received: 26 March 2017
Accepted: 22 May 2017

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Citation: Eslami H. **Greywater, a New Alternative Approach for Domestic Wastewater Separation and Reuse in Iran**. J Environ Health Sustain Dev. 2017; 2 (2): 257-9.

Nowadays, rapid increases in population, shortage of water resources, and mismanagement of available water resources have led most of the countries to search for new water resources [1- 3]. One of the most important alternative water resources to cope with water scarcity is treatment and reuse of domestic wastewater [4- 6]. Greywater (GW) includes about 60-70% of the total domestic wastewater produced in houses [7]. GW is a part of domestic wastewater, including effluents of showers, baths, wash basins, laundry, and kitchen sinks [8, 9]. Therefore, with appropriate reuse of GW, domestic potable water consumption would be reduced [10].

Treatment and reuse of GW have been adopted by several countries due to its safety, health, and economic cost [11- 15]. Moreover, GW has less pollution compared to the municipal wastewater and is therefore suitable for reuse [16].With proper treatment of this water, effluent can be used for irrigation, flash tanks at toilets, and other uses [17]. Considering that Iran is an arid country with a growing population and scarce water resources, appropriate strategies must be taken into account for efficient use of resources. Therefore, treatment and reuse of GW can compensate a part of water shortage.

Recently, various physical, chemical, and biological methods have been implemented for GW treatment. Studies showed that physical treatment systems such as multimedia filtration and membrane processes have good efficiency in removal of solids, but do not have a good efficiency in removal of organic compounds [18, 19]. Appropriate alternative to membrane processes such as Micro Filtration (MF), Ultra Filtration (UF), Nano Filtration (NF), and Reserve Osmosis (RO) is using these processes as a post treatment option for GW treatment [20]. Chemical processes have appropriate efficiency in removal of organic matter, suspended solids, and surfactants in GW; nonetheless, information on chemical treatment systems is limited; it is just known that these systems have very low hydraulic retention time while their cost is too high [21]. Therefore, chemical-biological or chemical-physical combination methods can be used for GW treatment to reduce the chemical methods' costs [22].

Biological treatment systems generally have good efficiency for removal of organic compounds in wastewater treatment. Integrated Fixed-film Activated Sludge (IFAS) as a biological treatment system is an integrated process containing microorganisms with suspended and attached growth. This system has higher resistance to organic and hydraulic loading shock than conventional activated sludge [23].

In this study, IFAS was investigated for GW treatment in 105 days. The results indicated that the IFAS systems have generally appropriate efficiency for GW treatment, especially to remove organic compounds (BOD_5, COD, TN and TP) and suspended solids, while using these systems alone do not have sufficient efficiency for removal of microorganisms [24].

As a result, to achieve standards for GW reuse, IFAS biological system can be used in combination with a disinfection or membrane filtration as an appropriate alternative method for GW treatment and reuse.

Acknowledgements

This Article is a Part of a Research Project (Code: 7217) adopted by the Environmental Science and Technology research center at Shahid Sadoughi University of Medical Sciences in Yazd.

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