

Greywater Reuse: Composition, Microbiology, and Current Technologies

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Abstract

Water usage in the world has increased at a pace exceeding our population growth, with developing countries using more water than the rest of the world to maintain a standard of living. Developing countries are dealing with limited access to clean water, one of the largest contributions to poor health. Wastewater is currently treated as a material to be disposed of, not as a by-product that can be reused. Greywater is a source of wastewater that can be treated for reuse much simpler than current mixed sewage. Treatment of greywater is a way to lessen the burden on potable water. To accomplish the goal of utilizing greywater, the concepts of composition, microbiology, and current technologies are necessary for the development of greywater. Through the development of greywater technology the world can see a benefit in both health and the health of the environment.

This paper present information on greywater that will broaden the understanding of greywater, and aid in the development of the uses for greywater and the different technologies involved.

Keywords

Greywater, graywater, reuse, irrigation

Introduction

Water in Iowa is seen as a disposable commodity, it flows readily from our ground and over our earth. We live in a state that has an abundance, with little need for crop irrigation or water rationing. Globally this is not the case. In many areas of the world that are densely populated water is a scarce resource that is controlled. Most of the Southwestern United States gets its water from the muddy Colorado River piped in from Lake Powel. Populations center have risen in once nomadic Africa, causing water shortages that have affected newly formed population centers. New ways to deal with water are needed. The first is to treat water as a resource, and a resource is best conserved by reuse. Clean water is of a health concern in the third world, with expense being of high interest.

Greywater is defined as any water produced in the home other than that used in toilet flushing. Toilet water is referred to commonly as blackwater. Sewer water is commonly a mixture of both greywater and blackwater. During its journey to a centralized wastewater treatment facility it is mixed with industrial waste and hospital waste, further complicating the final influent of the treatment facility. Hospitals introduce high concentrations of pharmaceuticals and industries can increase the chemical oxygen demand (COD) and introduce micropollutants that are new to wastewater treatment.

Greywater represents a wastewater that can be treated far easier than common sewer wastewater. As Shin *et al.* (1998) state, "blackwater is generally treated separately in septic tanks while greywater can be treated easier and more economically for reuse." It has the possibility to be treated onsite or in small, decentralized treatment facilities, and then recycled into the community it was generated from as irrigation for gardens, lawns, or farmland. Current research for treatment of greywater has utilized all forms of wastewater treatment; from reverse osmosis and other small conventional treatment facilities to wetland treatment. All of these processes stand to gain in effluent water quality when they properly manage their microbial communities; even a mechanical process such as reverse osmosis can utilize microbes in the form of membrane bioreactors.

Composition of Greywater

As stated earlier, greywater is washwater, consisting of all the water used in a home that is not used to flush the toilet. Greywater also can vary widely from household to household and region to region. The variance occurs by how much chemicals a family will use to clean and how these chemicals are disposed of. An understanding of the basics of greywater characteristics is important in the conception of the differences between greywater and conventional sewage.