

Greywater guidelines for home gardens in Gauteng

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1. INTRODUCTION

The human race needs water to survive, to work, to eat, to live healthily and to participate in recreation. These activities have resulted in the Earth's water becoming scarce and polluted as water is used at an alarming rate. The global population increase is placing demands on all natural systems and as pressures on available water increase, so more measures are required to supply water to users. Researchers generally state that between 2015 and 2033, the water demand in South Africa will exceed supply and the supply will not be able to cope with the anticipated population growth, consumption and other needs for water. This pressure is exacerbated by the fact that South Africa is a water scarce country and only receives an average of 492 mm per annum (Fig 1).

The majority of summer rainfall areas in South Africa and specifically the Gauteng area have had 16 consecutive years of above-average rainfall, barring the summer of 2014, and the last major drought was almost more than two decades ago. This helps to create a false sense of water security.

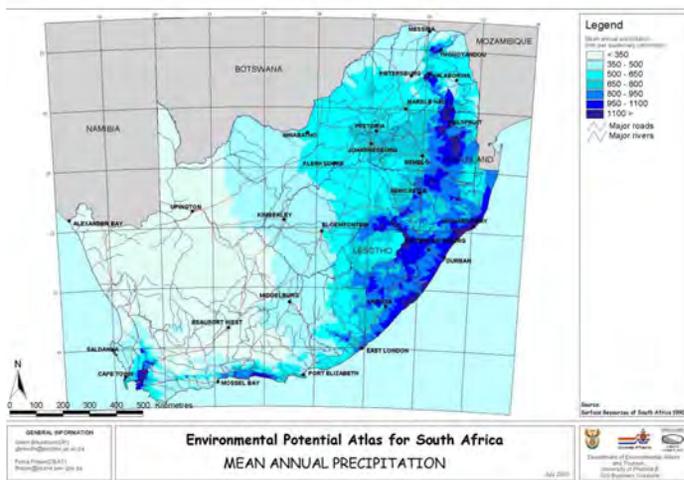


Fig 1. Mean annual precipitation map for South Africa.

In South Africa, municipal water use, which includes domestic water and water used in the garden, is indicated at being 27% of the total water used. A major component of domestic water consumption is gardening, estimated at 31-50% of the total water use. The use of water for gardening could be reduced drastically if homeowners implement the following initiatives:

- use of water-wise gardening concepts and drought-resistant indigenous plants;
- mulching of soil to preserve soil moisture;
- efficient irrigation systems and irrigation scheduling;
- rainwater harvesting and
- the reuse of wastewater (greywater);
- Soil improvement processes e.g. composting.

Greywater presents a potentially suitable water resource that can be used for irrigating certain plants such as flowers, shrubs, trees and lawns in home gardens.

2. WHAT IS GREYWATER?

Greywater is wastewater (used household water) collected from handbasins, showers, baths, washing machines and kitchen sinks, but excludes water collected from toilets.

1. Laundry water contains soaps, detergents, bleaches, water softeners, lint, dirt and small amounts of skin or faecal matter from clothes. Recently, many detergents have become biodegradable and safe to the environment. This water is suitable for irrigation use if your detergent is biodegradable.
2. Kitchen sink or dishwasher greywater may contain soap, detergents, grease, oils, blood, small traces of pesticides and food scraps. It should not be used for irrigation unless the water does not contain grease, blood, pesticides or oils.
3. Shower and bath water contains small amounts of soaps and shampoo as well as hair, skin, oil, faecal matter and urine, but can also contain residues of cleaning products. This water is suitable for irrigation use.
4. Handbasin water can contain soap, toothpaste, mouthwash, hair and shaving cream as well as residues of cleaning products. This water is suitable for irrigation use.

Greywater from the bathroom (handbasin, shower and bath) presents the best source of greywater for irrigation where greywater is separated by source, as it is considered to be the least contaminated of all the greywater in the home. Water from your toilet, which is considered black water, is not suitable for any reuse in or around your home.



A greywater system connected to the bathroom of this household

NOTES

- Using environmentally friendly soaps, detergents and cleaning products will positively improve the quality of your greywater and be an advantage to your garden.
- You can only install a commercial greywater system if your sewerage pipes are visible on the outside of your house .
- Do not always irrigate in the same place with greywater. Constantly move the sprinkler watering system or pipe in the garden.

Read more about greywater here:

- www.gardenResQ.co.za/reuse_water.html
- www.enchantrix.co.za
- www.oasisdesign.net/greywater/
- www.waterwise.co.za/site/home.html
- www.waterrhapsody.co.za/



3. GREYWATER QUALITY

The quality of water needed for irrigation and other non-drinking applications does not have to be of the same quality as required for potable water. In South Africa, though, the common practice is to use drinking water for non-drinking applications such as washing paving and vehicles and irrigating gardens. However, this is not sustainable.

The quality of water used for agriculture and irrigation is governed by the South African Water Quality Guidelines Volume 4. These guidelines can be used to monitor the quality of greywater use if that greywater is reused for the purposes of irrigation.

Elize van Staden conducted research through UNISA on the use of differently treated greywater in homes. Results showed that even greywater passed through an old stocking was suitable for use to irrigate the garden.

Water quality is described by physical, chemical and biological characteristics:

- Physical quality includes turbidity (clarity of the water), temperature and the total suspended solids in the water.
- Chemical quality includes pH (acidity or alkalinity of the water), chlorine (found in disinfectants in cleaning products), the amount of dissolved oxygen in the water and chemical oxygen demand (COD) – a measure of the amount of organic material in the water.
- Biological quality mainly relates to the presence of bacteria and viruses, and the presence of E. coli, which indicates the presence of faecal contamination and thus biological water quality.

National legislation does not prohibit the reuse of greywater and, at present, there are no formal standards or guidelines for the reuse of greywater for irrigation in South Africa. The disposal of wastewater is subject to regulations and by-laws of relevant local councils and as there is currently no known regulation or by-law prohibiting the reuse of greywater in the Rand Water supply area, greywater can be reused. However, use must not contravene the National Health Act 61 of 2003 and allow greywater to create a nuisance, which is defined as fly/mosquito breeding, objectionable odours, the surface ponding of water and/or the entry of polluted water onto a neighbouring property.

Storage:

If greywater is stored before it is treated, microorganisms start to degrade the organic matter in the greywater. This increases the growth of microorganisms, which in turn leads to an anaerobic environment that generates unpleasant odours. Greywater storage for longer than 24 hours is therefore discouraged. A filter is essential for any greywater system. It is generally a good idea to catch the lint, hair and other particles that you don't want in your landscape. The simplest, most cost-effective way to filter your greywater is to use a nylon stocking or a sock on the end of your drainage hose before it enters the garden or a collection chamber.

The advantage of this type of filter is that it can be easily discarded and replaced with a new one.

4. GREYWATER REUSE

Greywater has been reused for irrigation purposes for many years all over the world and specifically in countries with very similar climatic conditions to South Africa, such as Australia, Europe (Spain, Denmark), Japan, Israel, Jordan and USA (California, New Mexico and Arizona).

Why should you reuse greywater?

- Use less of our valuable potable or fresh water and save thousands of litres of drinking water.
- Reduce the impact on natural water resources by reducing water consumption.
- Save money on water bills.
- Ensure a constant water supply for the garden.
- Possibly add nutrients from the greywater that are beneficial to plants and soil (Fig 2).
- Have the satisfaction of taking responsibility for efficient use of a valuable, finite resource.
- Reduce the flow to the sewerage system, thereby reducing water treatment costs.

Benefits of using greywater

- Depending on the source, greywater may contain small and varying amounts of nitrogen and phosphorus, which are potential sources of plant nutrients.
- The soapy nature of greywater can sometimes act as a pest repellent.
- It saves potable water.



Fig 2. Rosemary thrives if irrigated with greywater.

Disadvantages of using greywater

- Hair from the bath and shower can cause pipe and pump blockage if it is not filtered.
- Pathogens may be present. A pathogen is anything that can produce a disease and typically means an infectious agent or microorganism, such as a virus or bacteria that causes a disease in its host.
- Chemicals in bleaches and fabric softeners can have detrimental effects on soil and plants.
- Soaps and detergents containing substantial amounts of sodium can negatively affect plants and soil.

Rand Water and UNISA baseline research shows that the quality of greywater from sample homes in suburbs are all within the parameters of the South African water quality guidelines for irrigation. This means that greywater from your bathroom is safe to use for irrigation in your garden.

5. HOW TO USE GREYWATER

Plants (Fig 3)

- In general, tough drought-tolerant plants will do best with greywater irrigation or watering.
- Greywater is typically alkaline, so avoid using it for extended periods of time on acid-loving plants such as azaleas, begonias, gardenias, hibiscus, camellias and ferns. Greywater should not be used on fynbos and proteas either.
- All plants will benefit from an occasional flushing of rainwater or tapwater to remove any greywater residue on the plant leaves if you've used the "sprayer" system.
- Pay attention to what your plants are telling you. Dry, wilted or curled leaves can be signs of lack of water, while wilted shoot tips or soft plant tissue can mean overwatering.
- Examples of some plants that thrive on greywater irrigation are olives, rosemary, bougainvillea, lavender, Cape honeysuckle, Italian cypress, bearded iris and petunias.



Fig 3. Using greywater collected with a bucket to water pot plants.

Soil

- Don't overwater the same patch of soil with greywater, and prevent runoff by not watering your soil faster than it can absorb the greywater.
- Don't use greywater on soil with high clay content and low drainage, as pooling of water may be encouraged.

Detergents and soaps

Some of the ingredients in detergents and soaps can be harmful to your plants, however some are very beneficial. Consider the following chemical characteristics when using greywater:

- Alkalinity/acidity - refers to the relative pH of soil and water. Greywater tends to be alkaline, which is generally desirable and beneficial to your plants.
- Boron - a plant micronutrient, required in only very, very small amounts. Very high concentrations of boron can cause injury or death to plants.
- Nitrogen - a very necessary nutrient for plant growth, very beneficial as a supplement to your plants.
- Phosphorus - a necessary plant nutrient, which is very beneficial to your landscape plants.
- Potassium - a plant nutrient which is, in general, beneficial to plants.
- Sodium - can act as a plant poison by reducing the plant's ability to take up water from the soil.
- Chlorine - undesirable for plants. Minimising its contact with your garden is very important.

6. GREYWATER REUSE RULES

You can use your greywater if:

- You use natural cleaning products or environmentally safe products where possible.
- You supplement your irrigation once a month with clean municipal water or rainwater.
- All your greywater originates from your own residence and is not allowed to leave the boundary on which it is generated.
- You apply the greywater in such a way that it is not allowed to form ponds on the surfaces after watering.
- You never use irrigation systems that spray a fine mist.
- Your greywater system has an overflow or diversion directed into the sewage collection system.
- Your greywater system collection tank is covered to restrict access and to eliminate a habitat for mosquitoes or other vectors.

Do not:

- Store greywater for longer than 24 hours before it is reused.
- Use water from the kitchen (see Point 2. 'What is greywater' for more information).
- Use laundry water - especially if it has been used to wash nappies or other clothing soiled by faeces and/or urine.
- Let children and pets drink or play directly in or around greywater.
- Allow greywater to flow into watercourses, swimming pools or dams.
- Spray or mist with greywater, as this may introduce pathogens into the air, which could be inhaled.
- Use greywater if anyone on the premises is suffering from an infectious disease.
- Irrigate fruits and vegetables from above with greywater if they are going to be eaten raw.

7. GREYWATER SYSTEMS

The best solution for the reuse of greywater of households in sewered areas is to reuse greywater in such a manner that it does not need any treatment at all. The reason for this is that household greywater is regarded as the best for reuse because of its relatively clean nature and does not require any further cleaning.

What is a greywater system?

A greywater system can be very simple, for instance you can use a bucket to carry your bathroom water outside to water a special plant. Other complex systems are available. Between these two extremes are many varieties of systems that you can use for irrigating watering with household greywater.

The goal is to find the level of system that makes maximum use of your greywater while minimising your costs for the purchase, installation and maintenance of your system. All greywater systems need a water source and a way to get the water from the source to the point of use. The different greywater systems each have their own system components to collect, transport and irrigate the greywater.

There are systems that treat both black and greywater to a standard that is suitable for use in the garden. If your greywater contains harmful contaminants such as oil or blood, consider a professional treatment system.

Bucket system (Fig 4): A simple bucket system can be used to transport the greywater, by hand, from the bathroom to garden. It is the cheapest system but is inconvenient and increases the possibility of contact and contamination between the greywater and people carrying the bucket .



Fig 4. Re-using greywater can be as simple as placing a bucket under the shower to collect used water.

Top of the range commercial greywater system: Households in suburban sewered areas have indoor plumbing and the greywater is collected via pipes that connect the source e.g. (bathroom water) to the sewerage system. The greywater system (Fig 5) is connected directly to the outlet pipes of the bathroom and the greywater is collected in a collection or storage tank without coming into contact with humans or even the open air. Before collection, the greywater is filtered to remove hair and lint. From the collection or storage tank, the greywater is pumped to irrigation pipes and distributed to the garden.



Fig 5. A commercial greywater system

There are many options available and the level of sophistication of the system depends on the amount of money you are prepared to pay. Commercial greywater systems each have their own filter or filtration system.

Maintenance of the system:

Regularly clean the filter to prevent clogging of the irrigation system. Commercial systems will have instructions of how to clean their filters. Sticking filters can be removed, discarded and replaced with a new one.

Irrigation (Fig 6):

Most commercial systems in South Africa use hosepipes for grey water irrigation. Don't use greywater in a mist system (pathogens can be dispersed in the mist) or a commercial drip system (particles will clog the drip nozzles).



Fig 6. Irrigation specialists encourage people to use specific purple piping when irrigating with grey water.

Greywater chemical treatment:

When greywater is used for garden irrigation, it does not require any treatment . When an occasional unpleasant odour is experienced, you can use a small amount of swimming pool chlorine or bleach to clean the water (this is seldom the case).

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Be Water Wise!

This pamphlet was developed by Rand Water in conjunction with Eliza van Staden (UNISA)

