Grey Water in Agriculture and the Potential Increase Risk of Pathogen Transport
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Introduction
The purpose of this poster is to investigate grey water in agriculture, as seen in Figure 1, and the potential risk it has on pathogen transport. “Grey water is defined as water collected from sewage discharge of clothes washers, bathtubs, showers and sinks, excluding wastewater from toilets [1].” Reusing grey water in irrigation is cost effective and eco-friendly. However, there are possible risks associated with using grey water. These risks include viruses and bacteria such as Salmonella, Norovirus, Entero virus, E. coli, Giardia, Pseudomonas aeruginosa, Staphylococcus aureus, Clostridia and Rotavirus. [2].

Potential Impact Eco. Services
The reuse of greywater in irrigation without filtration causes harmful effects on food, water, and soil services.

Greywater contaminated with pathogens, as shown in Figure 3, is used to irrigate crops, which are then consumed by humans. This not only causes negative environmental effects to the crops, but in return causes human health risks.

Sensitive Unit
One of the key sensitive units in greywater reuse is the presence or absence of a filter. How important this depends on the levels of pathogens and bacteria in the original greywater sample.

In one study that assessed how well plants grew using both filtered and not filtered greywater, there was not a very significant difference between rates of growth for the plants or health of the plants for human consumption. Filtration can help to prevent buildup of metals or other contaminants in the soil [8].

Different filtration systems can be considered to treat the greywater. Gravel filters, pump operated filters, and commonly used industrial filtration systems are all viable options, as seen in Figure 4. Additionally, natural materials such as Moringa oleifera, or sawdust, have been shown to reduce the presence of targeted pollutants in the greywater [7].

Research
One way in which this topic could be researched further is to conduct more in-depth tests of various filters and filtration systems in order to find more efficient ways to clean grey water than what is currently used. This would increase the cleanliness of the water and decrease the time and money spent in filtering it.

Hypothesis: Heavier and more complex filtration systems will clean grey water more efficiently compared to less complex systems.

Protocol
- Use multiple different filtration systems to filter the water.
- Collect unfiltered water from all methods.

Analysis:
- Samples are tested for possible pathogen levels using microbial risk assessment.
- Compare results between the different filtration systems.

References