Vegetable Wash Water Reuse

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What is this research about?

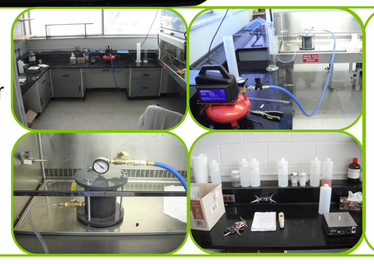
- Processing of fresh-cut vegetables use a lot of fresh water. Water is extensively used for preparing and packaging. This leads to large quantities of wash water being generated.
- The goal of the study is to develop and analyze a wash water reuse system to minimize water consumption and reduce the waste generated.
- The main objective is to conduct analysis on the use of physiochemical methods to remove solids from wash water to achieve water reuse.

Wash Water is generated from the processing of various vegetables

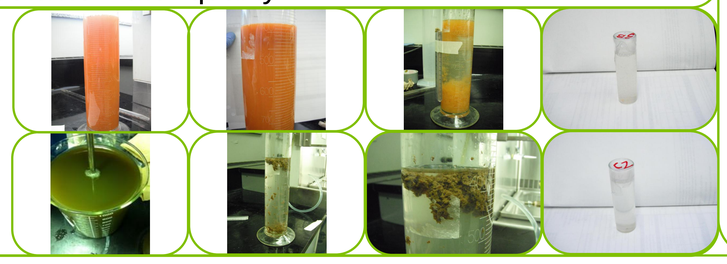
Brand Beckman GS-6R Centrifuge to evaluate centrifuge technology

What did the researcher do?

- Collected samples from fresh-cut vegetable processors to determine wash water characteristics, such as Total Solids, Suspended Solids, Turbidity and pH.
- Physical and chemical methods can be effective at reducing solids. Dissolved air flotation (DAF) and Centrifuge with coagulation and flocculation will be explored.
- Conducted bench scale tests to evaluate the removal efficiency of DAF and Centrifuge methods using wash water samples collected from fresh-cut vegetable processors.
- Preliminary analysis of membrane and disinfection technology to provide additional treatment to achieve water reuse of potable water quality.



Dissolved Air Flotation apparatus setup



Dissolved Air Flotation testing

Wash Water collected from a vegetable processing facility

Stage 1 | Stage 2 | Stage 3 | Combined stream

What the researcher found?

- Characteristics of Vegetable Wash Water are listed in Table 1.
- Bench scale testing of DAF and Centrifuge has demonstrated efficient removal of solids as indicated in Table 2.
- Conduct economical, environmental, and social analysis to determine the feasibility of water reuse for fresh-cut vegetable processors.

Table 1	Low Solids (Spinach, Broccoli, etc.)	High Solids (Carrot, Potato, etc.)
pH (Temperature, °C)	7.3 (10)	7.4 (10)
Turbidity (NTU)	70-220	>1,000
Total Solids (mg/L)	1,100	10,000
Suspended Solids (mg/L)	450	4,000

Table 2	Removal Efficiency and Dosage		
Wash Water Type	Low Solids (Spinach, Broccoli, etc.)	High Solids (Carrot, Potato, etc.)	
Type of waste matter	Organic	Organic	Organic and Inorganic
DAF	72% with 50 mg/L	93% with 125 mg/L (Coag.); 125 mg/L (Floc.)	98% with 250 mg/L (Coag.); 250 mg/L (Floc.)
Centrifuge	94% with 100 mg/L	95% with 400 mg/L	99% with 350 mg/L

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What you need to know

- Water conservation by reusing wash water can mitigate the environmental impact associated with the waste generated. Cost savings can result from reducing pumping costs for fresh water and effluents discharge costs.
- Local fresh-cut vegetables processors can save money and stay competitive to provide fresh and safe food.
- Water reuse can reduce impact on public water supply and wastewater treatment plants. It can also be implemented in rural and agricultural areas to reduce land application of food waste, ultimately mitigating agricultural runoff into our Great Lakes.

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