

**An Investigation into Green Laundry Products
A Triple Bottom Line Assessment of the Feasibility of Selling Environmentally Friendly Laundry
Detergent at UBC Residences**

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ABSTRACT

The University of British Columbia's Student Housing and Hospitality services is looking for a green laundry detergent to introduce for sale at residence laundry facilities and mini-marts. This project aims to find a brand of laundry detergent that meets sustainability, environmental impact and economic criteria. UBC has committed to the Water Action Plan and the Sustainability Plan, therefore, recommendations were aligned with these policies. Triple bottom line assessment is used to analyze multiple "green" laundry detergents. Research methods include a survey among UBC students and a performance test on five brands of laundry detergents from results of the polling, Tide was set as a benchmark. Based on the criteria and the testing, two brands were recommended for resale at UBC residences: Vancouver Only and Nellie's.

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GLOSSARY

Builder: substance in detergent that removes positive ions in hard water in order to increase the efficiency of surfactants.

Bioplastics: plastics derived from renewable biodegradable sources such as plant and starch.

Catalyst: substance that accelerates chemical reactions without itself being affected.

Enzyme: biological molecules that act as catalysts in metabolic processes in living creatures.

Eutrophication: a negative ecosystem response to the addition of phosphate to fresh water. Negative environmental effects include great increase of algae which results from increased levels of nutrients, depletion of oxygen in the water which kills aquatic species.

Local: within 100 miles of radian.

Linear alkyl benzene sulfonates (LAS) : A class of synthetic anionic surfactants. LAS are the most common surfactants in use.

Nonylphenol ethoxylates (NPEs): a substance commonly used as surfactant in cleaning products. It is found to be persistent and, therefore, hazardous to the environment and human health.

Optical Whiteners: Also known as optical brightening agents (OBAs) and fluorescent brightening agents (FBAs) are dyes that absorb ultraviolet light and reflect visible blue light which enhance the appearance of color of fabric to human eyes.

Phosphate: an inorganic chemical often used in agriculture as fertilizers.

Surfactants : compounds that act as active cleaning agents in a cleaning product. A general term for Surface Active Agents.

Sodium tripolyphosphate (STPP): an inorganic compound. Often used as a builder in detergents to remove positive ions and increase the cleaning efficiency of surfactants.

Sustainability: UBC's definition of sustainability—We see sustainability not as a prescribed set of outcomes, but as the emergent property of a societal conversation about what kind of world we want to

live in, informed by some understanding of the ecological, social and economic consequences of different courses of action.

Ultraviolet (UV): electromagnetic radiation emitted by sun with wavelength shorter than that of visible light and high frequency. This radiation is generally not visible to human eyes.

Zeolites: minerals widely used in industry for water purification. It is also a common builder in detergent.

1. INTRODUCTION

The task of washing laundry has evolved significantly from being a labour-intensive, time consuming chore to being reduced to something accomplished with the press of a button. Aiding in the process of cleaning are the chemical technologies of laundry detergent, which have worked towards improving the cleaning effectiveness of laundry washing machines. The addition of surfactants, optical brighteners, and enzymes to laundry detergent have helped improve the effectiveness of washing (Frydendall, 2003) however, there have been unintended consequences to the environment (EPA, 1999).

As part of the University of British Columbia's (UBC) move to promote campus sustainability, UBC Student Housing and Hospitality Services (SHHS) has requested recommendations for a green laundry product that could be sold in residence laundry rooms and campus mini-marts. The investigation aims to align with UBC's Water Action Plan and Sustainability Plan. Through a triple bottom line assessment, environmentally friendly laundry detergent options were assessed for their environmental, social and economic impacts.

Several research methods were used to explore the factors affecting the project, as outlined by Richer et al. (2013). Through academic research, consumer polling and performance testing, a shortlist of green laundry detergents was established. The triple bottom line assessment of the options includes a life cycle assessment, an economic comparison of the total cost on each product and the social impact of detergent performance.

2. INVESTIGATION METHODS

2.1 DEFINING A GREEN LAUNDRY DETERGENT

2.1.1 Toxicity and Laundry Detergents

Most of the laundry detergents contain six categories of ingredients: surfactants, builders, whiteners and brighteners, enzymes, fragrance and coloring and fillers (Frydendall, 2003). Some of these ingredients are crucial in cleaning the clothes, however, not all of them are essential.

Surfactants, which provide cleaning power, are the main ingredient in laundry detergents. These surface-active agents have the ability to attract grease and dirt on one end of the molecule, and water on the other end. They form a tiny sphere around the dirt and are rinsed away as the washing machine agitates. Linear alkyl benzene sulfonates (LAS) are the most common surfactants in use (“Detergent Ingredients Glossary”, n.d.). Since LAS are synthetic, the pure LAS compounds may cause skin irritation on prolonged contact. Nonylphenol ethoxylates (NPEs), another example of surfactants, have high toxicity to aquatic organisms (EPA, 1999).

Typically, surfactants do not work well in hard water due to the excess positive ions it contains. This is where builders come in. Builders are bases that bind and remove calcium and magnesium ions in hard water, preventing them from reacting with surfactants. Some examples of builders include sodium tripolyphosphate (STPP) and zeolites (EPA, 1999). Although the addition of builders increase the efficiency of surfactant’s cleaning power, inorganic phosphate has the potential to cause eutrophication in fresh water, therefore, being phosphate free is an indicator of a green detergent.

Detergents may also contain whiteners and brighteners that make the clothes more appealing to human eyes. Optical whiteners, also known as optical brightening agents (OBAs), are synthetic chemicals that absorb ultraviolet (UV) light and emit back visible blue light. They simply trick the eye by making clothes “appear” whiter (“Detergent Ingredients Glossary”, n.d.). Bleaches are also common whitening agents as they remove color via oxidization, however, these whiteners are not necessary for cleaning and also are toxic to the environment. Aminotrazine-based or stilbene-based optical whiteners may cause developmental and reproductive effects as they are not biodegradable and may bioaccumulate (Bashar, 2005). Chlorine bleach, such as sodium hypochlorite, can form hazardous gases and effect human health. Moreover, chlorine-containing chemicals may “seep through soil down into groundwater” which can present ecological concerns (Wisconsin DHS, n.d.).

Enzymes, biological products present on clothing as catalysts, help speed up the decomposition of food particles (Frydendall, 2003). The use of enzymes allows lower temperature during washing cycles, which save energy consumption during laundry washing. A myth concerning detergent enzymes being harmful to human skin is proven incorrect by Basketter et al (2008). Medical experiments conducted by Basketter reveals that although enzymes cause allergic reactions in their raw state, enzyme-containing laundry products are not the cause of skin illness. Enzyme detergents have been shown to damage cotton fabric, resulting in changes in the feel of the fabric and a decreased brightness of colours. Potential chemical reactions between enzymes and most ingredients in laundry detergent may lower enzyme effectiveness.

Detergent may also contain some fragrance and coloring, which give detergents scents and appearance. Although small amount of dyes can visually show users whether there is detergent left after washing, as stated by Frydendall (2003), fragrance and coloring are generally unnecessary to laundry detergent. Most of these artificial chemicals do not degrade and have toxic effects both to the environment and human health (EPA, 1999).

The difference between powder detergents and liquid ones comes from different type of fillers used. Fillers served the purpose of making detergent more soluble and help it distribute evenly. Common filler of power detergents is sodium sulphate while common filler of liquid detergents is water. Although a study conducted by Kelada et al. (1978) in Saskatchewan shows no negative effect sodium sulphate have on human health, it does add another chemical to the mixture of detergent.

2.1.2 Other Factors

In addition to chemical additives, other factors can influence the environmental friendliness of laundry detergents. Packing material for laundry detergent ranges from several different types of material, including metal, plastic and cardboard. The environmental impact of each material type can be based on production costs, chemical additives and recyclability (Gray, 1990). In addition to conventional materials, bioplastics offer another alternative that is a compostable alternative to plastic (Kale et al., 2007). To improve the utilization of packing, laundry detergents could be shipped with less water, either in a concentrated formula or in powder form. Additionally, bulk purchasing would result in less packaging per load.

An attempt was made to choose laundry detergents that were sourced locally, preferably within 100 miles of consumption, however, information on detergent manufacture points were difficult to locate. Companies headquartered closer to Vancouver were then preferred, as well as companies that subscribed to a green philosophy rather than companies that produced select green products (Prakash, 2002).

2.2 ANALYSIS OF EXISTING LAUNDRY DETERGENT PREFERENCES

Like other household products, the purchase of laundry detergent can be made with little thought, however, if a brand of product does not meet expectations, it is very likely that the consumer will switch. The attempt to introduce environmentally friendly laundry detergent has extra social weight as UBC is choosing the sustainability label in addition to the brand. In order to have a successful adaptation to green products, it is important to understand the drivers behind brand preference. A green label may not be enough to motivate consumer change, so it is important that environmental friendly laundry detergent recommendations meet or exceed existing consumer preferences (Ottman et al., 2010)

Several factors may influence brand choice, including performance, cost, fragrance or allergens. To gain insight on student preferences, a survey was conducted at the Totem Park Residence common area. Questions were designed to explore existing preferences towards laundry detergent and also, to gain insight on student's attitudes towards environmentally friendly laundry practices. The survey target was chosen to be UBC undergraduate students, as they would be most likely to purchase the offered products. The questions (Table 1) were designed to analyze existing environmental, social and economic preferences. The survey length was kept to four questions to encourage students to answer a "quick" survey. Forty people were polled and the results tabulated in APPENDIX A: SURVEY QUESTIONS.

Table 1. Survey Questions

1. *What brand of laundry detergent do you currently use?*
2. *When you're buying detergent, what's more important? Price, performance or impact on the environment?*
3. *Have you or would you use cold water to wash your laundry?*
4. *Would you pay more to use a green product? How much more?*

The first question was used to establish the preferred brand of laundry detergent. The result would then be used as a benchmark for comparison testing. The second question explored what drove consumer choice when deciding on a laundry detergent. Three options were given to help students answer: price, performance or impact on the environment. Students were allowed to answer up to all three choices or could state that they had no preference.

The final questions explored attitudes to environmentally friendly laundry washing. Because of the potential for reducing energy consumption, it was important to understand students' attitudes towards cold water washing (Nidumolu, 2009). Finally, because of a tendency for environmental products to be more expensive (Holt, 2004), the last question determined if UBC students were willing to pay more for an eco-friendly product.

3. TRIPLE BOTTOM LINE ANALYSIS

3.1 ENVIRONMENTAL IMPACT

Vancouver is home to several environmentally friendly retailers, resulting in a large number of environmentally friendly laundry detergents options to choose from. A longlist was developed from choices available from local retailers. Brands included Seventh Generation, Arm & Hammer, Method, Nellie’s, NatureClean, Ecover and Vancouver Only (Table 2).

Based on the research conducted, several criteria were developed to help define and narrow down environmentally friendly options. Chemical additives were the first conditions to be met and brands, such as Method and Arm and Hammer, failed to meet the condition that detergents not contain optical brighteners or whiteners. Additionally, it was preferred that brands be locally sourced, which eliminated the Ecover brand.

Table 2. "Green" Brands versus Researched Environmentally Friendly Criteria

Criteria	Seventh Generation	Arm & Hammer	Method	Nellie's	Nature Clean	Ecover	Vancouver Only
Phosphate free	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nonylphenol ethoxylates free	Yes	Yes	Yes	Yes	Yes	Yes	?
Biodegradable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Has not been tested on animals	Yes	Yes	Yes	Yes	Yes	Yes	?
Works in cold water	Yes	Yes	Yes	Yes	Yes	Yes	?
Concentrated formulas	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No optical brightener / whiteners	Yes	No	No	Yes	Yes	Yes	?
Less scent and coloring	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comments:						Not local-made in Belgium	Limited information available and no ingredients list

Among our options was a powder detergent marketed as a green product for local use. Vancouver Only is retailed only at Whole Foods and claims to be a phosphate free, biodegradable laundry detergent. Because of its potential as a cost efficient, environmentally friendly, local product, it was selected for testing before research into its composition was complete.

Among the four brands remaining, Seventh Generation, Nellie's, Nature Clean and Vancouver Only, packaging and sale size varied considerably. All container types were recyclable or compostable in various forms. Seventh Generation is distributed in cardboard containers with liquid detergent contained in plastic. Nellie's is sold in metal containers with plastic container powder detergent. Vancouver Only came in a biodegradable plastic bag. Nature Clean was the worst option as it is sold in a conventional plastic container.

Most detergents were available in sizes ranging from 1L to 2.5L, which is suitable for resale to individual students. While this is convenient, another alternative is to consider bulk purchases, which will decrease the amount of packaging consumption. If this option is considered, a bulk laundry detergent dispensing system would need to be considered, however, investigating options is outside the scope of the project analysis.

3.2 ECONOMIC IMPACT

Because the target consumers for the green laundry product are students, budget considerations are important to the feasibility of the project. When students were asked if they would consider paying more for an environmentally friendly product, 98% responded yes. Most students stated they would pay an additional \$2 based on an average cost of \$7-8. A weighted average of the results suggests that students would be willing to pay a \$1.61 price premium for an environmentally friendly product.

The brands selected for testing were analyzed for their cost, which was normalized to a per load price (Table 3). On average, liquid detergents cost \$0.24 per load, while powdered detergent costs less at \$0.16 per load for a price difference of \$0.09.

Another major factor in pricing is the distribution size. Products distributed in larger sizes tended to be less expensive. This was not true for the Seventh Generation liquid laundry detergent, however, the price difference may be due to the concentration differences. Bulk pricing was most noticeable for Nellie's brand powder detergent, which had the lowest per load cost in the test population at \$0.09 per load.

Extra Cost Students Willing to Pay for Environmental Friendly Laundry Detergent

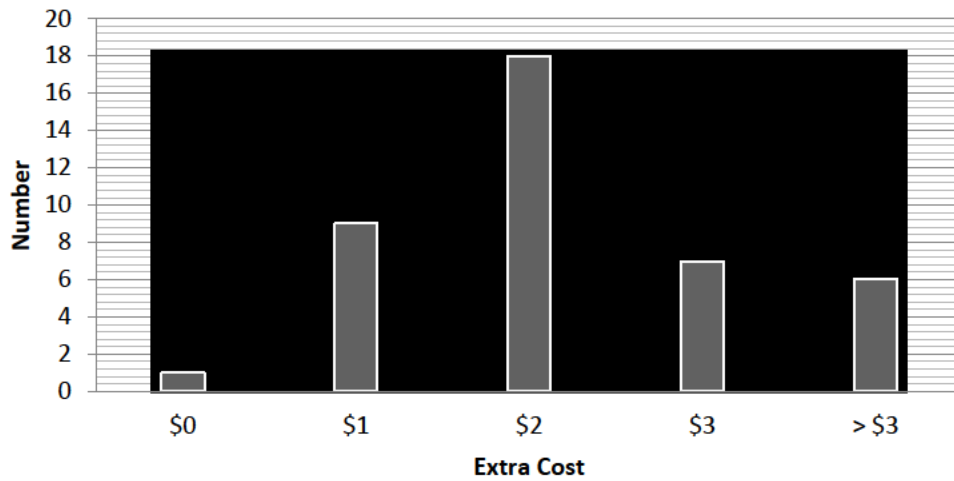


Figure 1. Price tolerance for green laundry detergents

Table 3. Price and Load Information

Brand	Price	Loads	Cost per Load	Form	Comments
<i>Tide Cold water</i>	\$ 6.46	52	\$ 0.12	Liquid	2x concentrated
	\$ 15.95	64	\$ 0.25	Liquid	
<i>Seventh Generation</i>	\$ 17.99	66	\$ 0.27	Liquid	2x concentrated
	\$ 11.75	33	\$ 0.36	Liquid	4x concentrated
<i>Nellie's</i>	\$ 94.99	1100	\$ 0.09	Powder	
	\$ 124.00	1100	\$ 0.11	Powder	
	\$ 8.50	50	\$ 0.17	Powder	
	\$ 17.99	100	\$ 0.18	Powder	
	\$ 19.00	100	\$ 0.19	Powder	
	\$ 10.00	50	\$ 0.20	Powder	
<i>NatureClean</i>	\$ 27.99	129	\$ 0.22	Liquid	
<i>Vancouver Only</i>	\$ 5.99	35	\$ 0.17	Powder	

Assessing the options, there are many alternatives in line with the price per load of the benchmark laundry detergent brand. Tide Cold water was found to cost anywhere from \$0.12 to \$0.25, which is comparable to other laundry detergents. Table 4 summarizes the best price options for bulk and individual sale size for both liquid and powder laundry. Bulk powder was found to be the least expensive, with Nellie's costing \$0.09 per load. For individual sized powder detergent, both Nellie's and Vancouver Only were comparable at \$0.17 per load. Liquid detergents were found to have a smaller

price margin between bulk and individual size, with NatureClean cost \$0.22 per load and Seventh Generation, \$0.27 per load.

Price research was conducted online and through supermarket research to understand the generation price differences between brands. Because UBC yields a considerably larger purchasing power, it is likely that per load cost for each laundry brand will be lower.

Table 4. Lowest Price Laundry Detergent based on Form and Sale Size

	Powder	\$/Load	Liquid	\$/Load
Bulk	Nellie's	\$ 0.09	NatureClean	\$ 0.22
Individual	Nellie's	\$ 0.17	Seventh Generation	\$ 0.27
	Vancouver Only	\$ 0.17		

3.3 SOCIAL IMPACT

3.3.1 Consumer Preferences

From the survey results, Tide was determined to be the brand preference among UBC undergraduate students. Just over 77% of respondents used Tide and the remaining preferences were split evenly between Kirkland, Sunlight, Method and Downy (Figure 2). The majority of students stated that price and performance were their prime drivers when choosing a laundry detergent. Included in performance were subcategories, such as cleaning effectiveness, smell, or allergens. Roughly 50% of the students polled stated that they considered the environment when making their decisions.

Because of the potential energy savings, students were polled on their experience and attitudes towards cold water washing. The vast majority of students polled were favourable to the idea, with 95% responding that they had either normally used cold water washing or were open to the idea. Only two students responded that they were against cold water washing.

Laundry Detergent Brand Preferences at UBC Residences

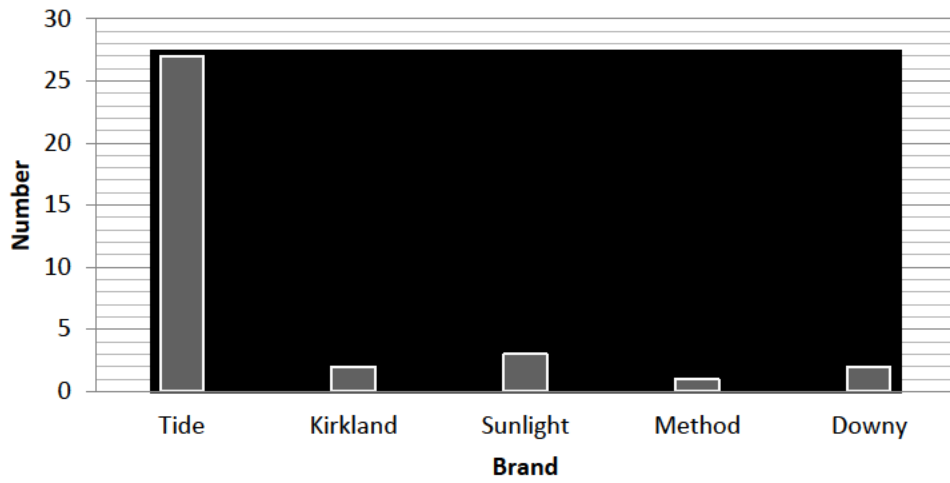


Figure 2. Laundry detergent brand preference

Qualities Valued in Laundry Detergent Purchasing Decisions

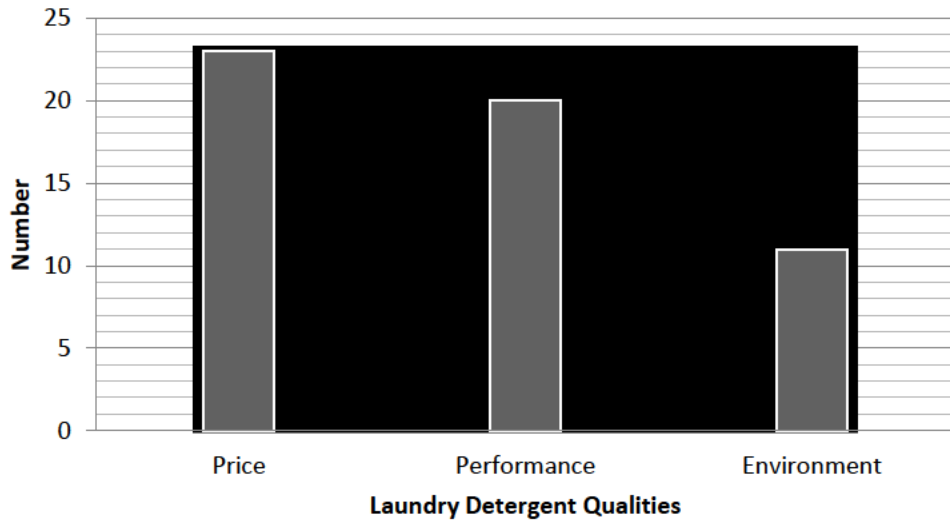


Figure 3. Qualities valued in laundry detergent purchasing decisions

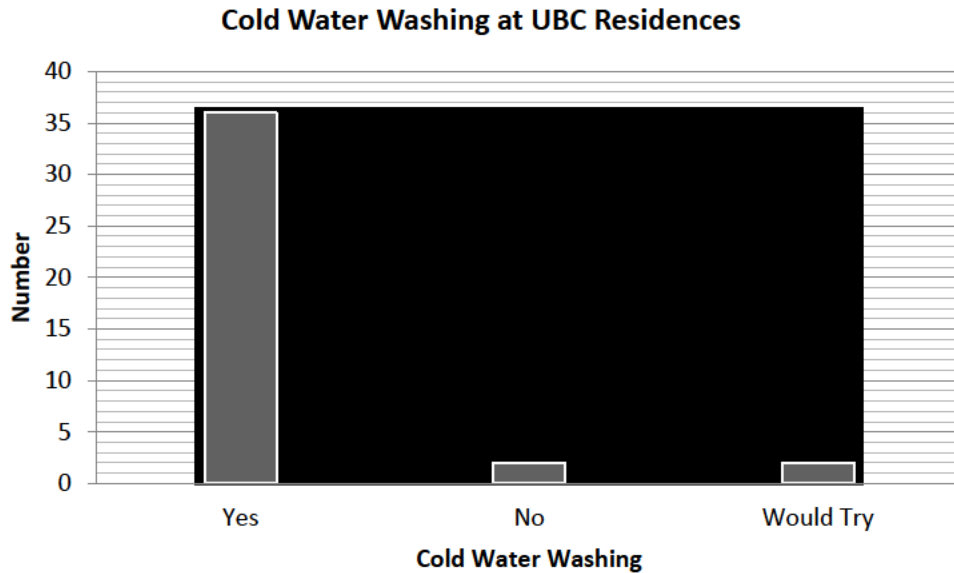


Figure 4. Cold water washing preferences

3.3.2 Performance Testing

The results of the survey demonstrated a high priority was placed on the performance of the laundry detergent purchased by UBC students living in residence. To test the performance of the laundry detergents an experiment was conducted to gauge how well the different detergents cleaned clothing. The laundry detergent candidates that fit the set criteria of ingredients were tested against the benchmark Tide Cold Water.

Five stains were applied to five pieces of cotton fabric: olive oil, ketchup, mustard, tea, and egg. These substances were chosen because they are known to be tough stains to remove. These stains were applied to each piece of cotton fabric with the same amount for each of the different substances. Following the application of the substances the fabric with stains were left to set for twenty four hours. Photographs were taken of each of the cotton strips to record the stains before they were put through the washing machine (Figure 5 to Figure 6).

After the stains had a chance to set the pieces of fabric were washed each with two towels and with the specified amount of detergent per load for each of the laundry detergent candidates. The washing machine’s settings were all put on light soil level, normal cycle setting, and cold water washing. The

results of the stains on the cotton strips were then compared to the photographs taken of the cotton strips before they were washed.

Table 5. Performance Testing Results

	Olive Oil	Ketchup	Mustard	Tea	Egg	TOTAL
Tide	2.5	3.0	1.8	3.0	3.0	<i>13.3</i>
Vancouver Only	1.8	3.0	2.8	2.3	3.0	<i>12.8</i>
Seventh Generation	2.0	3.0	1.5	3.0	3.0	<i>12.5</i>
Nellies	1.3	2.3	3.0	2.0	3.0	<i>11.5</i>
Nature Clean	1.3	1.8	1.0	3.0	2.8	<i>9.8</i>

The removal of each stain was ranked on a scale of one for poor removal, two for satisfactory removal, and three for good removal. In order to compare the laundry detergents the value of the ranking for each stain (one, two, or three) was added to a resultant total value for each different laundry detergent. The higher the total value, the better the performance of the laundry detergents on these stains (Table 5).

Tide performed well on most of the stains and received the highest ranking in the performance test. Considerably lower than the other brands, Nature Clean received the lowest score due to its inability to effectively remove olive oil and mustard. The remaining brands performed relatively well compared to Tide and are considered to be comparable in quality. Among the green options, Vancouver Only scored the highest with a notably high mustard score.

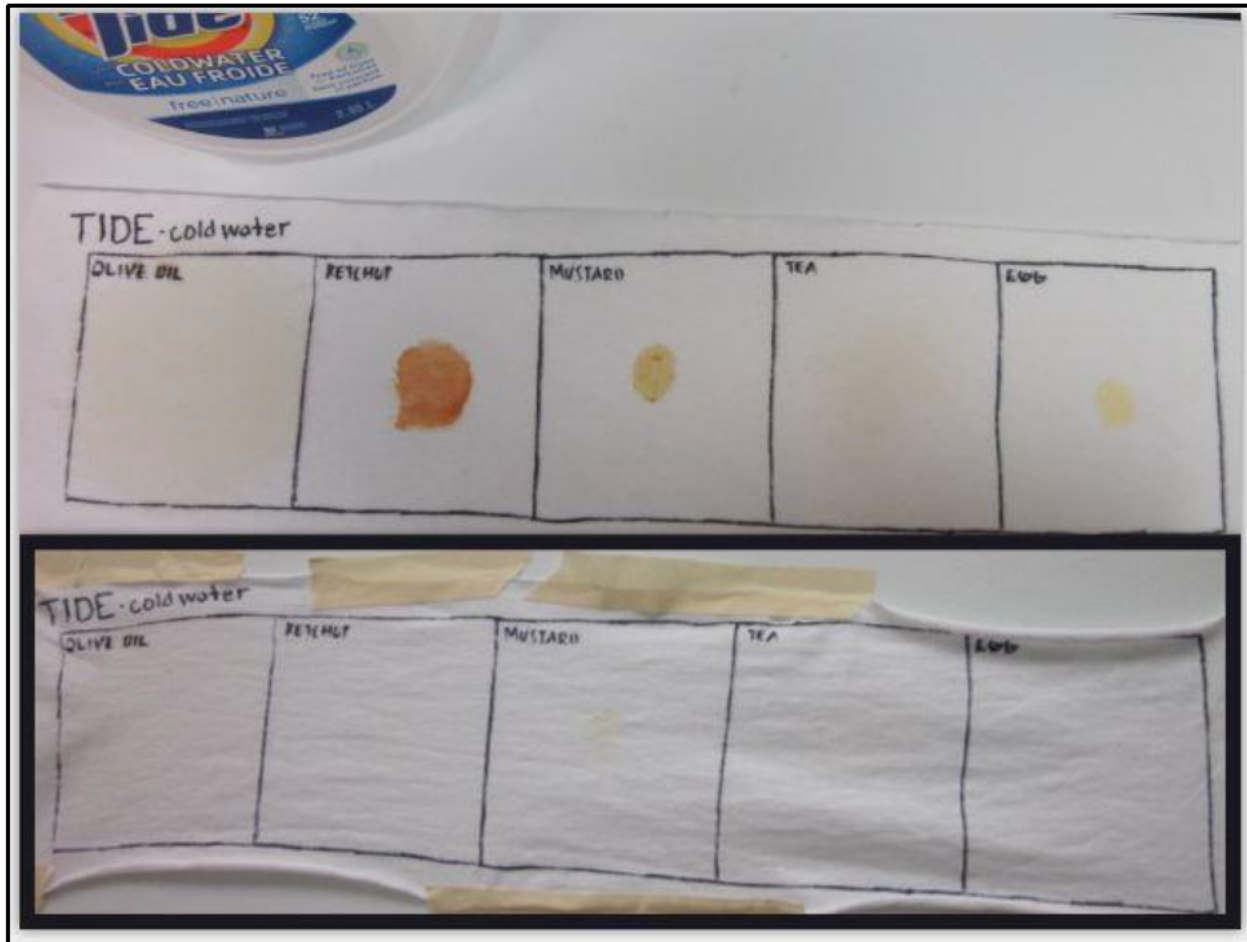


Figure 5. Tide before and after performance testing



Figure 6. Vancouver Only before and after performance testing



Figure 7. Seventh Generation before and after performance testing



Figure 8. Nellie's before and after performance testing



Figure 9. NatureClean before and after performance testing

4. CONCLUSION AND RECOMMENDATIONS

Through research into the environmental impacts of laundry detergent, a list of green attributes helped define a list of laundry detergents that were environmentally friendly. Harmful chemicals and additives, packaging and local sourcing were criteria that helped narrow down the numerous choices of supposedly green laundry detergents to four that were chosen to meet a specific definition: Nellie's, Vancouver Only, Nature Clean and Seventh Generation.

Depending on the distribution method and form, economic analysis found various options for laundry detergents that were affordable and even less expensive than the benchmark brand. For powder form detergent, Nellie's and Vancouver Only were found to be the most economic brands. For liquid detergent, Seventh Generation and Nature Clean were the price leaders.

Through social investigation, students were found to choose laundry detergents based on performance. Comparison testing found that Tide was most effective at stain removal, however, three detergents were a close second in performance. Vancouver Only was given the highest score among green options, followed closely by Seventh Generation and Nellie's.

For the successful adaptation of green laundry products, proposed products should meet or exceed existing criteria set by the benchmark brand, Tide. Among the shortlisted products, Vancouver Only and Nellie's are the recommended brands for sale on UBC campus residences. Both products meet the environmental criteria through their chemical components, packaging, and local sourcing. Distributed in both bulk and for individual sale, they are the most cost efficient per laundry load. Additionally, both brands performed well in laundry testing and were close to the benchmark in stain removal ability.

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APPENDIX A: SURVEY QUESTIONS

1. *What brand of laundry detergent do you currently use?*
2. *When you're buying detergent, what's more important? Price, performance or impact on the environment?*
3. *Have you or would you use cold water to wash your laundry?*
4. *Would you pay more to use a green product? How much more?*

APPENDIX B: SURVEY DATA

Table 6. Raw Survey Results

Brand	Cold Water	\$	P	E	Extra Cost
Tide	Y	Y	Y		1
Tide	Y	Y			2
Tide	W		Y		2
Tide	Y	Y			3
Tide	Y			Y	3
Tide	Y	Y	Y	Y	3
Tide	Y		Y		1
Tide	Y		Y		2
Tide	Y		Y		3
Tide	Y	Y			2
Tide	Y		Y		2
Tide	Y	Y		Y	1
Tide	Y	Y			2
Tide	Y	Y	Y	Y	2
Tide	Y	Y		Y	5
Tide	Y			Y	2
Kirkland	Y			Y	2
Tide	Y				1
Tide	Y	Y			2
Tide	Y	Y			2
Downy	Y	Y			2
Downy	Y	Y	Y	Y	2
Sunlight	Y		Y		5
Gain	Y	Y		Y	3
Sunlight	Y	Y	Y		1
Gain	Y	Y			2
Tide	Y	Y			2
Tide	Y	Y		Y	3
Tide	Y		Y		2
Tide	Y	Y	Y	Y	1
Tide	Y	Y			3
Method	Y		Y		5
Sunlight	Y		Y	Y	5
Tide	N	Y	Y		5
Tide	N	Y			1
Tide	Y				5
Tide	Y		Y		2
Tide	Y	Y	Y		1
Tide	Y		Y		0
Kirkland	Y	Y	Y	Y	1

Table 7. Laundry Detergent Brand Preference

Laundry Brand	Tide	Kirkland	Sunlight	Method	Downy
	27	2	3	1	2

Table 8. Leading Drivers of Brand Selection for Laundry Detergents

Preferences	Price	Performance	Environment
	23	20	11

Table 9. Cold Water Washing Preferences

Cold Water	Yes	No	Would Try
	36	2	2

Table 10. Price Premium Students Are Willing to Pay For A Green Laundry Detergent

Extra	\$0	\$1	\$2	\$3	> \$3
	1	9	18	7	6

APPENDIX C: LIST OF LAUNDRY INGREDIENTS

Seventh Generation

aqua (water), sodium lauryl sulfate (plant-derived cleaning agent), laureth-6 (plant-based cleaning agent), sodium citrate (plant-derived water softener), glycerin (plant-derived enzyme stabilizer), oleic acid (plant-derived anti-foaming agent), sodium hydroxide (mineral-derived pH adjuster), boric acid (mineral-derived enzyme stabilizer), calcium chloride (mineral enzyme stabilizer), protease, amylase and mannanase (plant-derived enzyme soil removers), essential oils and botanical extracts* in Geranium Blossoms & Vanilla only: (prunus amygdalus dulcis (sweet almond) oil, citrus aurantium dulcis (orange) peel oil, citrus limon (lemon) peel oil, pogostemon cablin (patchouli) oil, cedrol, litsea cubeba fruit oil, cananga odorata flower (ylang ylang) oil, citrus aurantium bergamia (bergamot) fruit oil, citronellol, vanillin, coriandrum sativum (coriander) fruit oil, beta-caryophyllene, eugenia caryophyllus (clove) leaf oil, pelargonium graveolens flower (geranium) oil), methylisothiazolinone and benzisothiazolinone (synthetic preservatives).

Arm and Hammer

water, sodium alkyl aryl ether sulfate, C12-14 alcohol ethoxylate, C12-16 alcohol ethoxylate, sodium carbonate, fragrance, acrylic acid homopolymer, oleic acid, methylglycine diacetic acid, trisodium salt, brightner

Method

coco/soy methyl ester + sulfonate / ethoxylate (surfactant (cleaning agent)), lauryl + oleoyl alcohol ethoxylates (surfactant (cleaning agent)), glycerin (solvent), sodium alkane sulfonate (surfactant (cleaning agent)), peg 300 monoethyl ether (surfactant (cleaning agent)), decyl glucoside (surfactant (cleaning agent)), ethyl levulinate glycerol ketal (solvent), carboxymethylinulin (anti-redeposition agent), mipa-lactate (alkalinity builder), cellulase, protease, amylase, mannanase, lipase (cleaning enzymes), ethanol (solvent), purified water (diluent), carboxylate polymer (builder / anti-redeposition), distyrylbiphenolsulfonate (optical brightener), propane diol (solvent)

Nellie's

coconut oil based surfactant (cleaner), sodium carbonate (soda ash) (provides water softener and alkalinity), sodium metasilicate (makes detergent non-corrosive to metals), fatty alcohol ethoxylate (cleaner), sodium chloride (holds together)

Nature Clean

aqua/water/eau, decyl glucoside (mild plant derived cleanser), sodium citrate (natural water softener), cellulose gum(natural anti redeposition agent), magnesium nitrate (natural mineral), magnesium chloride (natural mineral), sodium chloride (table salt-viscosity enhancer), methylisothiazolinone and methylchloroisothiazolinone (preservative-maintain product freshness and prevents bacteria growth)

Ecover

aqua, sodium laureth sulfate, propanediol, coco-glucoside, sodium citrate, isostearic acid, alcohol denat., sodium lauryl sulfate, Formic acid, sodium hydroxide, sodium gluconate, calcium chloride, lipase, mannanase, subtilisin, amylase, cellulase