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Natural cleaners: Essential oils put to the test against bleach, vinegar

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Some tout that essential oils can soothe aches, calm your mind and clean your home. With the help of the educational lab at Florida SouthWestern State College, we compared two essential oils to traditional cleaners.

Rebecca Harwick currently uses essential oils to help with her toddler Evan's health, and to fill her home with good smells. But recently she's considered using them to clean.

"I'm a little skeptical. Like do they really clean that well? Get the germs? Get the bacteria?" Harwick asked.

With the help of Amanda Zirzow, the science lab manager, at Florida SouthWestern State College, we tested essential oils efficacy. We tested four products: bleach, white vinegar, lemon oil and melaleuca (tea tree) oil.

"Everyday we use a number of different antiseptics and disinfectants, and what we want to do is evaluate the relative effectiveness of those disinfectants," Zirzow explained. "One method or beginning approach you can use to answer this question is the filter paper disk diffusion method."

First, she introduced two commonly found bacteria: *E. coli* and *Staphylococcus epidermidis*. She used a tool to spread the bacteria. Then, Zirzow took each cleaning substance, put it on the filter paper disk and placed the disk on the bacteria.

"When we place the disinfectant or the solution on the filter paper disk, what happens is that you have this diffusion away from the filter paper disk of the compound into the nutrient agar or Petri dish. So the farther away the compound diffuses, it's a lower concentration and that's why there's a correlation between the size of the zone of inhibition and how effective the disinfectant is."

After 24 hours in an incubator at 37 degrees Celsius, Zirzow removed the Petri dishes and measured the zone of inhibition.

"Consistent with already published studies, we found that the tea tree oil and the lemon oil are effective in killing the bacteria," But as Zirzow explained the lemon oil didn't do the job quite as well as the tea tree oil, bleach, and white vinegar. "The lemon oil did kill the bacteria, but a higher concentration of the lemon oil might be needed."

Zirzow did remind us this test only looked at the relative effectiveness of the essential oils, but not if there are any health risks associated with the use of the products.

We reached out the American Cleaning Institute about the use of traditional cleaners who said you can often find ingredients for conventional cleaners on the manufacturer's website or app.

Effect of cleaning products on bacterial growth.

American Cleaning Institute full response:

Consumers may have been misled by statements that imply that there is little or no access to information on product ingredients. The fact is that there is more information available than ever before about cleaning products and their ingredients. Manufacturers unveiled a broad industry communication initiative in 2010 that set the stage for ever-evolving ways to access information: product labels, company and brand websites and toll-free hotlines. These outreach efforts are particularly important today as more consumers choose to obtain product and ingredient information digitally (online, smartphones, etc.).

Additionally, California has since enacted a product ingredient labeling law that manufacturers are working to comply with over the next two years. If consumers have questions about product ingredients, they should consult the label, check the brand or company website, or contact the manufacturer directly.

Regarding product safety: The cleaning products industry dedicates an enormous amount of resources to assure the safety of products, including many millions of dollars spent in research, development, and testing before products ever hit the shelves. Additionally, products must meet all applicable federal and state quality, safety and labeling regulations.

Millions of people use cleaning products safely and effectively every single day when the products are used as directed and properly stored.

Regarding mix-at-home cleaning recipes: We understand that Americans exhibit a can-do and do-it-yourself ethic in all facets of life, including make-your-own cleaning products. But there's often little safety, use or ingredient information offered by the purveyors of some of these schemes.

When it comes to making your cleaning products, consumers should think twice before mixing once. There can be serious safety implications if don't take proper care.

Questions to answer when considering making your cleaning products:

- Has the recipe been tested for cleaning purposes and by whom?
- What is the correct amount of product you should use?
- Are you aware of any safety precautions for mixing the recipe or combining with other products?
- Will you have the recipe available if you call the Poison Help Line at 1-800-222-1222 if there is an accident?
- Do you know how to treat accidental exposures?
- Are there any special instructions for safe disposal?
- Is the recipe as cost-effective as a commercially formulated cleaning product?

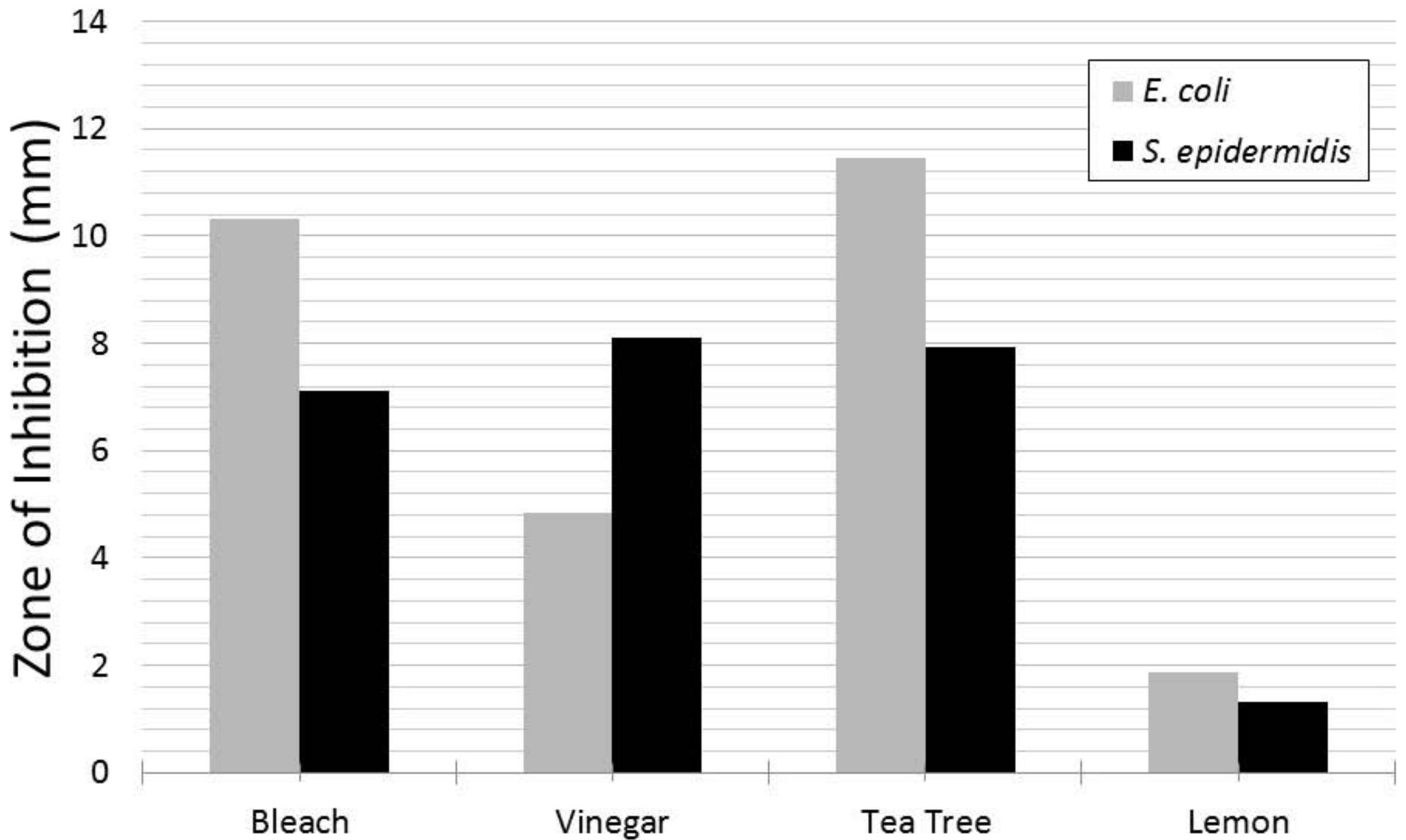
Your viewers can find science-based information on using cleaning products safely and properly on ACI's website, www.cleaninginstitute.org.

Other articles about this testing:

Carson, C. F., Hammer, K. A., & Riley, T. V. (2006). *Melaleuca alternifolia* (Tea Tree) Oil: a Review of Antimicrobial and Other Medicinal Properties. *Clinical Microbiology Reviews*, 19(1), 50–62. <http://doi.org/10.1128/CMR.19.1.50-62.2006>

Prabuseenivasan, S., Jayakumar, M., & Ignacimuthu, S. (2006). In vitro antibacterial activity of some plant essential oils. *BMC Complementary and Alternative Medicine*, 6, 39. <http://doi.org/10.1186/1472-6882-6-39>

Effect of Cleaning Products on Bacterial Growth



ZOI = Zone of Inhibition

<i>S. epidermidis</i>	ZOI (mm)			Average (mm)	Analysis	
Bleach 1	15.166	12.435	11.772	13.124	Average	10.309
Bleach 2	8.648	9.436	8.764	8.949	stdev	2.43832422
Bleach 3	8.741	8.998	8.824	8.854		
Vinegar 1	4.020	3.733	5.113	4.289	Average	4.853
Vinegar 2	5.129	4.823	5.734	5.229	stdev	0.497843832
Vinegar 3	5.400	5.031	4.698	5.043		
Tea Tree 1	9.093	8.807	9.030	8.977	Average	11.442
Tea Tree 2	12.999	12.920	13.429	13.116	stdev	2.180359629
Tea Tree 3	12.014	11.863	12.826	12.234		
Lemon 1	1.731	1.502	1.608	1.614	Average	1.863
Lemon 2	1.856	2.082	2.397	2.112	stdev	0.352139177

<i>E. coli</i>	ZOI (mm)			Average (mm)	Analysis	
Bleach 1	10.060	6.054	7.981	8.032	Average	7.126
Bleach 2	6.601	6.602	5.951	6.385	stdev	0.835576337
Bleach 3	6.303	7.308	7.278	6.963		
Vinegar 1	6.159	6.211	6.283	6.218	Average	8.106
Vinegar 2	9.404	9.376	8.501	9.094	stdev	1.635647884
Vinegar 3	10.367	8.237	8.413	9.006		
Tea Tree 1	10.299	9.400	9.579	9.759	Average	7.936
Tea Tree 2	6.437	6.291	6.346	6.358	stdev	1.71388694
Tea Tree 3	7.886	7.465	7.721	7.691		
Lemon 1	1.724	0.971	1.135	1.277	Average	1.326
Lemon 2	1.847	0.649	1.847	1.448	stdev	0.105539005
Lemon 3	1.435	1.365	0.965	1.255		

	<i>E. coli</i>		<i>S. epidermidis</i>	
	Avg	Stdev	Avg	Stdev
Bleach	10.30933333	2.43832422	7.126444444	0.835576337
Vinegar	4.853444444	0.497843832	8.105666667	1.635647884
Tea Tree	11.44233333	2.180359629	7.936	1.71388694
Lemon	1.862666667	0.352139177	1.326444444	0.105539005

	<i>E. coli</i>	<i>S. epidermidis</i>
Bleach	10.30933333	7.126444444
Vinegar	4.853444444	8.105666667
Tea Tree	11.44233333	7.936
Lemon	1.862666667	1.326444444