Red Wine Stain Removal

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This study on red wine stain removal was conducted during the summer of 2001 by Natalie Ramirez, a participant in a special summer high school research program supported on campus by the College of Agricultural and Environmental Sciences. This unique program is designed to enhance academic skills and to stimulate and encourage an interest in the agricultural, environmental and consumer sciences. Selected high school students, such as Natalie, are invited to work and study at UC Davis under the supervision and guidance of a UC Davis faculty or staff member from the College of Agricultural and Environmental Sciences and the Agricultural Experiment Station.

Natalie spent her summer in Dr. Andrew Waterhouse's lab, where she conducted the following study to determine which cleaning methods, both commercial products and home remedies, would best remove red wine stains from a variety of white fabrics. She consulted numerous sources to find home and commercial stain-removal remedies, including books on the subject, housekeeping guides and the Internet. "Although both scientific and popular literature existed which describe red wine stain removal procedures," she says, "none seemed to include relevant data on those procedures' effectiveness." So, this report on wine stain does not give a single treatment, but actually compares the effectiveness of the various treatments. We found that some treatments worked better on particular fabrics, and there are many situations where common remedies, such as white wine or salt, were not effective and left very visible stains.

Natalie's internship involved the creation of a detailed technical report and statistical analysis. Before beginning her research, however, she had to do "a lot of library research to get up to speed," she says ruefully, as she hadn't yet completed a chemistry class. Natalie returned for her junior year at the end of her summer research program.

To analyze the effectiveness of wine stain treatments on white fabric, we divided our experiment into two sections. The first involved attempting to remove stains that had only been in the fabric for two minutes, to simulate a situation where it might be possible to treat a spill immediately. The other involved waiting 24 hours to carry out the treatment, as often a stain is not discovered until it has been on the fabric for a day or longer. Our expectation was that the 24 hour stains would be harder to remove - and generally that was true - but the treatments that were most effective on the 2-minute stains were usually also the most effective on the 24-hour stains. Silk was by far the most difficult fabric to clean.

A personal experience showed the value of the testing. Recently Dr. Waterhouse spilled some red wine on a silk carpet at home. "I immediately turned on my computer and opened up Natalie's data file," he said. "Then I ran off to the lab to pick up the bottle of Erado-sol. When I dabbed it on the carpet the stain seemed to vanish. Even my wife could not see a stain-lucky for me!"

The procedure: We soaked swatches of all-white fabric (cotton, a polyester/cotton blend, nylon and silk) in red wine. Then, after 2 minutes or 24 hours, the stain was treated and the swatch laundered in cold water approximately three hours after the treatment. After drying, the darkness of the stain was measured using a using a Minolta Colorimeter in order to obtain very precise measures of residual stain. Tests were done in triplicate to validate the results, and treated fabrics were compared against controls of both stained and unstained laundered fabric swatches.

The treatments included:

- 3% hydrogen peroxide mixed with an equal volume of Dawn liquid soap
- Camco's Erado-Sol laboratory cleaning solution (Stain Rx)
- Gonzo "Wine Out" Red Wine Stain Remover
- "Wine Away" Red Wine Stain Remover
- Salt (applied only to 2 minute-stains, as it was used to absorb the liquid out of the fabric)
- Sauvignon Blanc white wine
- A solution of vinegar and Dawn liquid followed by rubbing alcohol
- Spray 'n Wash

COTTON

For 2-minute stains, the MOST effective treatments were:

Spray 'N Wash (after laundering, stain not visible)
Erado-sol (after laundering, stain not visible)
Peroxide/Dawn solution (after laundering, stain not visible)

For 24-hour stains, the MOST effective treatment was:

Peroxide/Dawn solution (after laundering, stain not visible)

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For 2-minute stains, the LEAST effective treatments were:
White wine (left a visible stain and results were the same as laundered-only "control" fabric)
Salt treatment (left a visible stain and results were the same as laundered-only "control" fabric)
Wine Away (left a visible stain which was worse than the laundered-only "control" fabric)

For 24-hour stains, the LEAST effective treatments were:
Wine Away (left a visible stain which was worse than the laundered-only "control" fabric)
White wine (left a visible stain which was worse than the laundered-only "control" fabric)

POLYESTER/COTTON BLEND

Our polyester/cotton blend results were somewhat similar to cotton results above, except that all the treatments we used were at least slightly better than laundering alone.

For 2-minute stains, the MOST effective treatments were:
Erado-sol (after laundering, stain not visible)
Peroxide/Dawn solution (after laundering, stain not visible)
Spray n Wash (after laundering stain barely visible)

For 24-hour stains, the MOST effective treatments were:
Peroxide/Dawn solution (after laundering, stain not visible)
Erado-sol (after laundering, stain barely visible)

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For 2-minute stains, the LEAST effective treatments were:
Wine Away (visible stain after laundering)
Salt (visible stain after laundering)

For 24-hour stains, the LEAST effective treatments were:
White wine (visible stain after laundering)
Wine Away (visible stain after laundering)

NYLON

For 2-minute stains, the MOST effective treatments were:
Erado-sol (after laundering, stain not visible)

White wine (after laundering, stain not visible)

For 24-hour stains, the MOST effective treatments were:
Erado-sol (after laundering, stain barely visible)
White wine (after laundering, stain barely visible)

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For 2-minute stains, the LEAST effective treatments were:
Wine Out (left a visible stain which was worse than the laundered-only "control" fabric)
Salt (left a visible stain which was worse than the laundered-only "control" fabric)

For 24-hour stains, the LEAST effective treatment was:
Wine Out (left a visible stain which was worse than the laundered-only "control" fabric)

SILK

Silk was most resistant to all our stain treatments. In most cases, the stain was not removed effectively.

For 2-minute stains, the MOST effective treatments were:
Erado-sol (after laundering, left only a very slight stain)
Peroxide/Dawn solution (after laundering, left a slight but detectable stain)
Spray N Wash (after laundering, left a slight but detectable stain)

For 24-hour stains, the MOST effective treatment was:
Peroxide/Dawn solution (after laundering, stain slightly visible)

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For 2-minute stains, the LEAST effective treatments were:
All other treatments on 2-minute stains left behind very obvious stains after laundering

For 24-hour stains, the LEAST effective treatment was:
White wine (left a visible stain which was worse than the laundered-only "control" fabric)

NOTES:

- While simple laundering brought cotton back to within 4% of the lightness of the unstained fabric, a level that is quite noticable (nylon was 1% and poly/cotton 6%), the laundered silk stain reflected 13% less light than the

unstained swatch, an unsightly stain indeed! Silk is not the fabric of choice for clumsy red wine drinkers.

- Overall, the best treatment, and a good choice in most cases, was the peroxide/Dawn solution. However, this treatment may bleach some colored fabrics, and while we did not see any bleaching in several tests we conducted on colored fabric, we would not use it without checking an inconspicuous area first.

- The first or second best treatment in all cases was Camco's Erado-sol. Erado-sol is not a common household cleaner, but it can be purchased online from the manufacturer at http://www.stainrx.com/ or from a laboratory supply house such as Fisher Scientific or at a Wine Education web site in California: http://www.UniversityofWine.com/

- Chlorine bleach and industrial non-chlorine bleaches are also very effective red wine stain removers (although we did not incorporate them into this study) on white fabrics, but cannot be used on non-white fabrics.

- The effective treatments here would also be the best bet for related stains, in particular red and blue berry stains, although some berry stains can be much harder to remove.

We still have more testing to do. If you have a recipe for red wine stain removal that you are willing to share, please send it to Professor Waterhouse at alwaterhouse@ucdavis.edu for our next high school summer student project!