

## Poster

### Comparing the Effectiveness of Two Mosquito-Repelling Treatments

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The transmission of diseases to humans by mosquitoes is an enduring health concern. Clothing made of densely woven fabrics is widely used to act as a barrier to intervene mosquito-human contact. In 2003, a chemical-based insect repelling apparel, Insect Shield®, received EPA registration in the United States. The Insect Shield® technology entails integrating permethrin, an insecticide, with textile fibres. Permethrin is a synthetic version of pyrethrum derived from the daisy *Chrysanthemum cinerarifolium*. It is an insecticide that immobilizes or kills insects by overstimulating their nervous system. Apparel made from Insect Shield® offers odour-free protection against insects, including mosquitoes. The protection is expected to withstand 70 launderings.

In Canada, although permethrin is not registered for use on clothing, the Public Health Agency of Canada recommends permethrin-treated clothing or travel gear for those who travel to countries where malaria is prevalent. Permethrin can be sprayed directly onto clothing. Unlike Insect Shield®, the protective effect withstands only 6 launderings.

The purpose of this project is to test the effectiveness of fabrics made with Insect Shield® in repelling mosquitoes versus the effectiveness of fabrics treated with a 0.5% permethrin spray before and after 75 cycles of accelerated laundering using AATCC Test Method 61-2009 Colorfastness to Laundering: Accelerated. The experiment entailed exposing 100% cotton Insect Shield® knit fabrics in their original condition in a chamber containing 20 laboratory-hatched *Aedes aegypti* mosquitoes. The same procedure was repeated after subjecting the fabric to 75 cycles of laundering. The second step was to expose 100% cotton knit fabrics with no treatment to 20 mosquitoes contained in a chamber. The same procedure was repeated after treating the fabric with a 0.5% permethrin spray and again after subjecting the fabric to 75 cycles of laundering. Each procedure was replicated once.

Each fabric was exposed to the mosquitoes for 5 minutes. Every 30 seconds, the number of mosquitoes that landed on the fabric was counted for a total of 10 observations. Furthermore, 30 minutes and 24 hours after the treated fabrics were withdrawn from the chamber containing the mosquitoes, 'knock down' was recorded. Knock down refers to the number of mosquitoes that were either immobilized or dead.

The results show that for the Insect Shield® fabric, the average number of mosquitoes landing on it was 2 before laundering and 3 after laundering. The knock down was 1 mosquito thirty minutes after the fabrics were withdrawn from the chamber and 14 after 24 hours. For the 100% cotton knit fabric with no permethrin spray treatment, the average number of mosquitoes landing on it was 12. After spray treatment with permethrin, the average number of mosquitoes landing on it was 2 before laundering and 3 after laundering. The knock down was 7 mosquitoes after 30 minutes and after 24 hours, all mosquitoes were dead.

In conclusion, the permethrin-treated fabric is shown to be effective in repelling mosquitoes. Both the Insect Shield® fabric and the permethrin-treated fabric were effective in repelling mosquitoes before and after 75 cycles of laundering. The effect of number of launderings on the mosquito-repelling function of the permethrin-sprayed fabric contradicts the performance reported in public domain. This calls for further research on the durability of permethrin spray on textile products. The permethrin-treated fabric had a quicker knock down time than the Insect Shield® fabric.