

Pleasant-smelling wood oil not so pleasant for biting ticks, other pests

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Cedarwood oil can be found in many consumer products—perfumes, soaps and deodorants among them. In addition to its pleasing scent, cedarwood oil also is prized for its insect-repelling and anti-fungal

properties.

Ticks aren't insects, but they, too, are repelled by cedarwood oil, according to recently published findings by Agricultural Research Service (ARS) scientists at the National Center for Agricultural Utilization Research in Peoria, Illinois.

In laboratory studies, the scientists exposed the nymph stages of five, hard-bodied [tick species](#) to various doses of cedarwood oil and compared the results to DEET, a commonly used synthetic insecticide.

Found in the heartwood of Eastern redcedar and other juniper tree species, cedarwood oil is among a variety of natural products that the researchers are testing as potentially safer or more sustainable alternatives to traditional pesticides derived from petroleum.

Ticks' hunger for a [blood meal](#) is creepy enough much less finding one latched on after a walk in tall grass or through brush where these flat-bodied arachnids lay in wait for a passing host. Far more concerning, though, is their ability to transmit disease-causing pathogens as they feed. One notable culprit is the black-legged tick, *Ixodes scapularis*, whose bite infects nearly half a million people annually with the bacterium that causes Lyme disease. To make matters worse, some ticks, such as the lone star tick (*Amblyomma americanum*) can induce Alpha-Gal Syndrome, a condition in which the person bitten by the tick develops a severe allergy to meat from livestock and other mammals.

Interestingly, the researchers found different species of ticks exhibit different degrees of susceptibility to cedarwood oil. For instance, the black-legged tick was the most susceptible of the four tick species exposed to cedarwood oil in the experiments. The others, in order of decreasing susceptibility were: brown dog tick (*Rhipicephalus sanguineus*), American dog tick (*Dermacentor variabilis*) and [lone star](#)

[tick](#) (*A. americanum*).

To test for repellency or toxicity to the ticks' nymph stages, scientists treated small pieces of filter paper with microgram amounts of cedarwood oil and placed the papers on short vertical rods. They then released the nymphs and recorded what happened to them upon crawling up the rods and contacting the treated paper. Contact with the oil-treated papers repelled 80 to 94 percent of black-legged tick nymphs, meaning they retreated, moved more slowly or dropped off the rods.

However, the oil's repellency faded with time. More of the nymphs (94 percent) were repelled 30 minutes after the oil had been applied to the paper than after 60 minutes (80 percent). Results such as these are important considerations in formulating the oil as a repellent product that can be applied to bare skin or clothing, for example.

In the experiments, DEET was more repellent than the cedarwood oil for all tick species except the black-legged tick nymphs. Against them, the oil worked just as well.

Full details of the work were published in the journal *Experimental and Applied Acarology*. Additional tests are necessary to determine the optimal doses to use and delivery method, they noted.

The tests also re-affirmed the benefits of using a procedure called supercritical fluid extraction, which relies on carbon dioxide (CO₂) to penetrate deeply into cedarwood shavings or sawdust where reserves of the oil can be removed without degrading its quality. Typically, a method called steam distillation is used. However, it is inefficient and degrades the oil during the process.

Starting in the early 2000s, research showed that CO₂ supercritical fluid extraction could yield 30 percent more cedarwood oil than steam

distillation. More recently, using CO₂ also resulted in a three-fold increase in the oil's concentration of cedrol, a biologically active ingredient that plays a major role in not only repelling [ticks](#), but also fire ants and other insects.

Pressure-treating lumber with an emulsion of the cedrol-rich oil also inhibits termites and fungi that cause wood decay, the researchers found.

More information: Lina B. Flor-Weiler et al, Repellency and toxicity of a CO₂-derived cedarwood oil on hard tick species (Ixodidae), *Experimental and Applied Acarology* (2022). [DOI: 10.1007/s10493-022-00692-0](#)

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