



ANALYSIS OF TICK REPELLENTS

Prepared by Moses Cucura, M.S.
Entomologist
Office of the Suffolk County Vector Control
Yaphank, NY
04/04/2017



Regional Tick-Borne Disease Resource Center

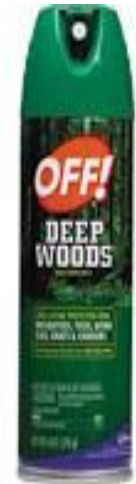
Help Line (631) 726-TICK

EastEndTickResource.org



DEET and Ticks

- 33% extended duration cream on skin, simulated forest floor trial
 - Repellency every 2 hours without reapplication
 - 97% protection from lone star nymphs over 12 hours ⁽¹⁾
- 33% extended duration lotion on clothing, 30 min field trial
 - 19% deer tick nymphs, 87% larvae ⁽²⁾
 - 50% dog tick adults, lone star nymphs and adults, 61% larvae ⁽²⁾
- Ultrathon, Sawyer and other Extended Duration formula may last 6 – 12 hours ⁽⁴⁾
- 20% aerosol on clothing, 1 hour field trials
 - 85% protection vs adult and nymph lone star ticks ⁽⁵⁾
 - 94% protection vs adult dog ticks ⁽⁵⁾
- 20% and 30% aerosol on clothing, 1 hour field trials
 - 86% protection vs all stages of deer tick (20% formula) ⁽⁷⁾
 - 92% protection vs all stages of deer tick (30% formula) ⁽⁷⁾
- 10% - 30% products may last 4- 6 hours ⁽⁴⁾
- May damage spandex, rayon, acetate, some leathers and plastics
- Excellent safety record, numerous studies and published articles
- Not recommended for children under 2 months of age by the American Academy of Pediatrics
- Note on sunscreen and DEET combinations: 6x increased systemic absorption of DEET ⁽⁶⁾ and decreased protections from sun in combination products ⁽³⁾



- (1) J.F. Carroll, J.P. Benante, J.A. Klun, C.E. White, M. Debboun, J.M. Pound and W. Dheranetra. 2008. Twelve-hour duration testing of cream formulations of three repellents against *Amblyomma americanum*. *Med. And Vet. Entomol.* 22: 144-151.
- (2) S.R. Evans, G.W. Korch, Jr and M.A. Lawson. 1990. Comparative Field Evaluation of Permethrin and Deet-Treated Military Uniforms for Personal Protection Against Ticks. *J. Med. Entomol.* 27(5): 829-834
- (3) A.D. Montemarano, R.K. Gupta, J.R. Burge, K. Klein. 1997. Insect Repellents and the Efficacy of Sunscreens. *Lancet.* 349: 1670-1671.
- (4) T.M. Katz, J.H. Miller and A.A. Hebert. 2008. Insect Repellents: Historical Perspectives and New Developments. *J. Am. Acad. Dermatol.* 58: 865-871.
- (5) G.A. Mount and E. L. Snoddy. 1983. Pressurized Sprays of Permethrin and Deet on Clothing for Personal protection Against the Lone Star Tick and The American Dog Tick. *J. Econ. Entomol.* 76: 529-531
- (6) E.A. Ross, K.A. Savage, L.J. Utley and I.R. Tebbett. 2004. Insect Repellents Interactions Sunscreens enhance DEET absorption. *Drug Metab. Dispos.* 32: 783-785.
- (7) C.E. Schreck, E.L. Snoddy and A. Spielman. 1986. Pressurized Sprays of Permethrin or Deet on Military Clothing for personal Protection Against *Ixodes dammini*. *J. Med. Entomol.* 23(4): 396-399.

Picaridin and Ticks

- Developed by Bayer based on piperine, a component in black pepper
 - Newer product in US not many comparative field studies available
 - WHO proclaimed as safe, effective and in some cases more effective than DEET (2)
- 10% and 20% Bayrepel cream on skin
 - Repellency tested every 2 hours
 - 97% and 100% repellency vs lone star nymphs (1)
- Avon: Skin-so-soft Bug Guard Plus Picaridin
 - Pump, spray or towelettes, creams and lotions
- Sawyer Picaridin Insect Repellent
 - 20% Lotion or 20% Pump Spray
- Few field based repellency studies on deer ticks or lone star ticks available
- A Consumers Union report determined 20% products lasted for 6 -8.5 hours vs ticks (2)
- Does not damage plastics, sealants or synthetics
- Excellent safety record, used in Europe for over 20 years no notable adverse effects (2)
- Sawyer 20% Picaridin safe for use during pregnancy and on children over 6 months of age (3)



(1) J.F. Carroll, J.P. Benante, J.A. Klun, C.E. White, M. Debboun, J.M. Pound and W. Dheranetra. 2008. Twelve-hour duration testing of cream formulations of three repellents against *Amblyomma americanum*. *Med. And Vet. Entomol.* 22: 144-151.

(2) K.C. Stafford III. Prevention of Tick Bite and Tick-Borne Disease: Tick Checks and Use of Repellents. The Conn.Agr. Exp. Station. (www.ct.gov/case)

(3) <https://sawyer.com/products/picaridin-insect-repellent/>

IR3535 and Ticks

- 20% pump/aerosols applied to forearm, average complete protection time
 - 12 hours for pump, 11 hours for aerosol vs deer tick nymphs ⁽¹⁾
- 10% lotion applied to forearm, average complete protection time
 - 9 hours protection vs deer tick nymphs ⁽¹⁾
- 5 -6 hour repellency listed on various products ⁽³⁾
 - Many products in combination with sunscreens
- Excellent safety record, used in Europe for decades ⁽¹⁾⁽²⁾
- EPA classified Biopesticide
- Few available published studies showing efficacy vs ticks ⁽¹⁾⁽²⁾



(1) S.P. Carroll. 2008. Prolonged Efficacy of IR3535 Repellents Against Mosquitos and Blacklegged Ticks in North America. J. Med. Entomol. 45(4): 706-714

(2) K.C. Stafford III. Prevention of Tick Bite and Tick-Borne Disease: Tick Checks and Use of Repellents. The Conn.Agri. Exp. Station. (www.ct.gov/case)

(3) <https://www.epa.gov/insect-repellents/find-insect-repellent-right-you>

Oil of Lemon Eucalyptus and Ticks

- Several products listed at <https://www.epa.gov/insect-repellents/find-insect-repellent-right-you>
 - Most products repellency data for ticks is not shared or stated on this site.
 - Products that do list repellency time between 2- 6 hours ⁽²⁾
- Few available published articles examining repellency or protection vs deer ticks, lone star ticks or dog ticks.
- A Consumers Union report determined (Repel) brand oil lemon eucalyptus (30%) lasted for 7-8 hours vs ticks ⁽¹⁾
- Products containing OLE specify that they should not be on children under 3 years old



(1) K.C. Stafford III. Prevention of Tick Bite and Tick-Borne Disease: Tick Checks and Use of Repellents. The Conn.Agr. Exp. Station. (www.ct.gov/case)

(2) <https://www.epa.gov/insect-repellents/find-insect-repellent-right-you>

Permethrin and Ticks

- .5% aerosol on clothing, 1 hour field exposures
 - 100% protection adult and nymph lone star and adult dog
- .5% aerosol sprayed on clothing, 1 hour field exposure
 - 100% protection vs all stages of deer ticks ⁽³⁾
- .5% aerosol sprayed on clothing, 30 min field exposure
 - 100% protection vs deer tick nymphs and larvae ⁽¹⁾
 - 87% vs Adult lone star tick, 95% nymph and 98% larvae ⁽¹⁾
 - 82% protection vs adult dog ticks ⁽¹⁾
- Permethrin Impregnated clothing - Using 40% Solution
 - 100% protection vs deer tick nymphs and larvae ⁽²⁾
 - 89% vs Adult lone star tick, 95% nymph and 97% larvae ⁽²⁾
 - 64% protection vs adult dog ticks ⁽²⁾
- Numerous published articles listing high levels of protections vs. ticks



(1) S.R. Evans, G.W. Korch, Jr and M.A. Lawson. 1990. Comparative Field Evaluation of Permethrin and Deet-Treated Military Uniforms for Personal Protection Against Ticks. J. Med. Entomol. 27(5): 829-834
(2) G.A. Mount and E. L. Snoddy. 1983. Pressurized Sprays of Permethrin and Deet on Clothing for Personal protection Against the Lone Star Tick and The American Dog Tick. J. Econ. Entomol. 76: 529-531
(3) C.E. Schreck, E.L. Snoddy and A. Spielman. 1986. Pressurized Sprays of Permethrin or Deet on Military Clothing for personal Protection Against Ixodes dammini. J. Med. Entomol. 23(4): 396-399.