

NEEM AS AN INSECT REPELLENT

Overview

Reiterating the disclaimers that appear on all the documents in this report, Neem Tree Farms DOES NOT sell a product that has been approved as an insect repellent in the United States. We are currently working with consultants to obtain that approval, but it is a difficult, expensive and time-consuming process. This research is presented only as a service to interested readers.

Honestly, we're not sure why some reports show that neem is effective and others indicate that it is not. Some differences may be explained by species of mosquito but not all. Neem, as a botanical product, also is sensitive to light and degrades over time, so that may play a role as well. Other thoughts from customers or experts would be appreciated, please contact us at vicki@neemtreefarms.com

Recent Research

[Ying Yong Sheng Tai Xue Bao](#). 2007 Feb;18(2):395-9.

[Changes of oviposition preference of diamondback moth after experiencing a neem-based repellent/deterrent BIOACT-T]

[Article in Chinese]

[Li YH](#), [Liu SS](#).

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http://www.ncbi.nlm.nih.gov/pubmed/17450746?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

For the adults of phytophagous insects, their experience of non-host plant-originated repellent/deterrent may produce habituation or induced preference to it. In this study, the experience-induced changes in oviposition responses of diamondback moth *Plutella xylostella* L. to a neem-based repellent BIOACT-T EC508 were examined in laboratory. 2-6 days old female moths were offered with 2--6 times or 2-6 days experience of the repellent, and their oviposition preference to untreated and BIOACT-treated Chinese cabbages were evaluated. The results showed that BIOACT had a strong repellent effect to all of the naive 2-6 days old females, that only laid approximately 10% of their eggs on BIOACT-treated plants. As for the 2, 4 and 6 days old females who experienced 2 times or 2 days, 4 times or 4 days, and 6 times or 6 days of BIOACT, their mean oviposition rate on BIOACT-treated plants increased to 17% , 21%--24% , and 29% , respectively, demonstrating that this experience of the females induced their habituation or preference to BIOACT, and consequently, the repellent effect of BIOACT decreased. However, there were substantial variations in the experience-induced changes of oviposition preference among the individuals of the moth.

PMID: 17450746 [PubMed - indexed for MEDLINE]

[Pest Manag Sci.](#) 2006 Jan;62(1):38-45.

Experience-altered oviposition responses to a neem-based product, Neemix, by the diamondback moth, *Plutella xylostella*.

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http://www.ncbi.nlm.nih.gov/pubmed/16217730?ordinalpos=3&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

The oviposition responses of the diamondback moth, *Plutella xylostella* L., to Neemix 4.5, a neem-based oviposition repellent/deterrent, with or without previous experience were studied in the laboratory on plain aluminum foil sheets, on aluminum foil sheets coated with cabbage juice, and on cabbage plants. In the plain aluminum foil sheet experiment, the females without prior experience of Neemix (inexperienced females) deposited more eggs (66.2%) on sections with untreated sheets than on sections with Neemix-treated sheets (33.8%), indicating that the inexperienced females were significantly repelled and/or deterred by Neemix. In contrast, the Neemix-experienced females deposited more eggs (69.2-69.7%) on sections with Neemix-treated sheets than on sections with untreated sheets (30.3-30.8%), implying that the females were not repelled and/or deterred by Neemix following an experience. In the tests using egg-laying sheets coated with cabbage juice or with cabbage juice plus Neemix, the inexperienced females deposited more eggs (63.8%) on the sections with sheets treated with cabbage juice only than on the sections with sheets coated with cabbage juice and Neemix (36.2%), indicating that inexperienced females were repelled and/or deterred by Neemix. Similarly, Neemix-experienced females deposited more eggs (62.2-65.6%) on the sections with sheets treated with cabbage juice plus Neemix than on the sections with sheets treated with juice only (34.4-37.8%), suggesting that the females were not repelled and/or deterred by Neemix following an experience. On cabbage plants, inexperienced females oviposited similar numbers of eggs on both Neemix-treated (50.8%) and untreated plants (49.2%). However, the Neemix-experienced females oviposited more eggs on the plants treated with Neemix (56.3%) than on untreated plants (43.7%), indicating that the females were attracted by Neemix-treated plants following an experience. The significance of this study for applications of insect repellents/deterrents in pest management is discussed. Copyright 2005 Society of Chemical Industry.

PMID: 16217730 [PubMed - indexed for MEDLINE]

[Exp Appl Acarol.](#) 2006;40(3-4):271-7. Epub 2006 Nov 14.

Repellency of MyggA Natural spray (para-menthane-3,8-diol) and RB86 (neem oil) against the tick *Ixodes ricinus* (Acari: Ixodidae) in the field in east-central Sweden.

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http://www.ncbi.nlm.nih.gov/pubmed/17103083?ordinalpos=2&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

In the field in south-central Sweden, we tested by randomised, standardised methodology the potential anti-tick repellent activity of two concentrations of MyggA Natural spray (containing PMD) (4.2 and 3.2 g/m²) and one of RB86 (with 70% neem oil containing azadirachtin) (3 g/m²) to host seeking nymphs of *Ixodes ricinus*. Each substance was applied separately to 1 m² cotton flannel cloths. Nymphal ticks on the cloths, pulled over the vegetation, were recorded at 10-m stops. Nymphal numbers recorded differed significantly between treated cloths [4.2 or 3.2 g MyggA Natural spray/m² and 3 g RB86/m²] and the untreated control (df = 3, chi² = 112.74, P < 0.0001). Nymphal numbers also differed significantly among collectors (df = 3, chi² = 15.80, P < 0.001). Repellency of treated cloths, i.e., 4.2 or 3.2 g MyggA Natural spray/m² and 3 g RB 86/m² declined from day 0 (i.e. the day of impregnation) to day 3 after impregnation from 77 to 24%, 58 to 16% and 47 to 0.5%, respectively. This study suggests that all three treatments have significant repellent activities against *I. ricinus* nymphs.
PMID: 17103083 [PubMed - indexed for MEDLINE]

[Bull Entomol Res.](#) 2005 Oct;95(5):457-65.

**Behavioural responses of diamondback moth *Plutella xylostella* (Lepidoptera: Plutellidae) to extracts derived from *Melia azedarach* and *Azadirachta indica*.
[Charleston DS](#), [Kfir R](#), [Vet LE](#), [Dicke M](#).**

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http://www.ncbi.nlm.nih.gov/pubmed/16197566?ordinalpos=4&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

The impact of three different doses of botanical insecticide derived from the syringa tree, *Melia azedarach* and the neem tree, *Azadirachta indica* was tested on the behaviour of the diamondback moth, *Plutella xylostella* (Linnaeus). Both botanical insecticides had a significant impact on larval behaviour. At higher doses the extracts showed feeding deterrent activity, with larvae preferring the untreated sides of cabbage leaves and consuming less of the treated half of cabbage leaves. The botanical insecticides had less of an effect on the oviposition behaviour of *P. xylostella* moths. In laboratory and glasshouse trials, significantly fewer eggs were oviposited on the plants that had been treated with syringa extracts. Therefore, the syringa extracts appear to have a repellent effect. In contrast, when exposed to the neem extracts the moths did not discriminate between control plants and treated plants. Behavioural observation indicated that, despite the lower number of eggs oviposited on cabbage treated with syringa extracts, the moths chose cabbage treated with the highest dose of syringa more often than they chose control cabbage plants. Similar observations were found in cabbage plants treated with neem, moths chose the medium dose more often than they chose the control. Oviposition and feeding deterrent properties are important factors in pest control, and results from this study indicate that botanical insecticides have the potential to be incorporated into control programmes for *P. xylostella* in South Africa.

PMID: 16197566 [PubMed - indexed for MEDLINE]

[J Agric Food Chem.](#) 2005 Jun 1;53(11):4633-6.

Citronella as an insect repellent in food packaging.

[Wong KK](#), [Signal FA](#), [Campion SH](#), [Motion RL](#).

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http://www.ncbi.nlm.nih.gov/pubmed/15913337?ordinalpos=5&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

Of five commercial plant extracts (citronella, garlic oil, neem extract, pine oil, and pyrethrum), citronella was found to be effective in deterring the infestation of cartons containing muesli and wheat germ by red flour beetles. The chemical components were applied as part of a coating on the carton board. In an experimental set up that accelerates infestation over a 2 week period, citronella-treated cartons (0.2 g/m² of carton board) reduced beetle infestation to approximately 50% of the level observed in control cartons. Evidence was provided to indicate that an insect repellent effect persists for at least 16 weeks. Additional work on the controlled release of the insect repellent would be required to prolong the effect.

PMID: 15913337 [PubMed - indexed for MEDLINE]

[Med Vet Entomol.](#) 2004 Dec;18(4):449-52.

Toward development of neem-based repellents against the Scottish Highland biting midge *Culicoides impunctatus*.

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http://www.ncbi.nlm.nih.gov/pubmed/15642014?ordinalpos=6&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

Oil of neem, from the tree *Azadirachta indica* A. Juss (Meliaceae), was evaluated for repellent and antifeedant activity against *Culicoides* biting midges (Diptera: Ceratopogonidae), by three complementary methods with serial dilutions. Electroantennograms revealed the sensitivity of *Culicoides nubeculosus* (Meigen) females to neem > or = 0.10%. *Culicoides impunctatus* Goetghebuer females were repelled by > or = 1% in a Y-tube olfactometer. Using a membrane feeder for wild-caught parous females of *C. impunctatus*, the proportion blood-feeding was significantly reduced by topical applications of neem oil > or = 0.10% concentrations, with blood-feeding completely prevented by > or = 1%. On the basis of these response data, we developed 2% neem-based formulations for personal protection against biting midges.

PMID: 15642014 [PubMed - indexed for MEDLINE]

[J Med Entomol.](#) 2004 Jul;41(4):726-30.

Laboratory evaluation of mosquito repellents against *Aedes albopictus*, *Culex nigripalpus*, and *Ochlerotatus triseriatus* (Diptera: Culicidae).

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http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15311467&query_hl=26&itool=pubmed_docsum

Four synthetic mosquito repellents (Autan [10% KBR3023], IR3535 [7.5%], Off! [15% deet], Skinsations [7% deet]) and eight natural (primarily plant extracts and/or essential oils) product-based repellents (Bite Blocker [2% soybean oil], ByGone, GonE!, Natrapel [10% citronella], Neem Aura, Sunswat, MosquitoSafe [25% geraniol], and Repel [26% p-menthane-3,8-diol]) were tested in the laboratory against *Aedes albopictus* Skuse, *Culex nigripalpus* Theobald, and *Ochlerotatus triseriatus* (Say). When estimated mean protection time (eMPT) responses for each repellent were averaged for all three mosquito species, Autan, Bite Blocker, Off!, and Repel prevented biting for > or =7.2 h; IR3535, MosquitoSafe, and Skinsations for 3.2-4.8 h; and ByGone, Natrapel, GonE, NeemAura, and SunSwat for 0.9-2.3 h. Against *Ae. albopictus*, the eMPT for Off! and Repel exceeded 7.0 h and ranged from 5.0 to 5.7 h for Autan, Bite Blocker, and Skinsations. Bygone, GonE, NeemAura, and SunSwat provided 0.2 h protection against *Ae. albopictus* and *Oc. triseriatus*, whereas Autan, Bite Blocker, Off., and Repel prevented bites by *Oc. triseriatus* for > or =7.3 h. All 12 repellents provided an eMPT > or =2.8 h against *Cx. nigripalpus* (maximum: 8.5 h for Bite Blocker). When the average eMPT for each repellent (for all species) was divided by the eMPT for 7% deet (Skinsations), the order of repellent effectiveness and the corresponding repellency index (R.) was Repel (1.7) > Bite Blocker (1.5) = Autan (1.5) = Off! (1.5) > Skinsations (1.0) > IR3535 (0.8) > MosquitoSafe (0.6) > Natrapel (0.5) > Neem Aura (0.3) = SunSwat (0.3) = Bygone (0.3) > GonE (0.2). PMID: 15311467 [PubMed - indexed for MEDLINE]

[Med Vet Entomol.](#) 2003 Dec;17(4):457-60.

Learning and memory in the mosquito *Aedes aegypti* shown by conditioning against oviposition deterrence.

[Kaur JS](#), [Lai YL](#), [Giger AD](#).

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http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=14651662&query_hl=1&itool=pubmed_docsum

Oviposition site choice by female mosquitoes, *Aedes aegypti* (L) (Diptera: Culicidae), was affected by rearing them in water treated with 0.016% of the repellent Mozaway trade mark containing citronella and neem. Given a choice between a bowl of repellent-treated and a bowl of untreated water, *Ae. aegypti* reared in untreated water strongly preferred to oviposit on the clean water (93-98%) instead of repellent-treated water. This demonstrates effective deterrence of oviposition by dilute Mozaway trade mark. Those reared in repellent-treated water were less deterred: 38-46% of their eggs were laid on the repellent-treated water and 54-62% on the clean water. Evidently the female mosquitoes reared in repellent-treated water were conditioned against oviposition site deterrence, as shown when choice tests were conducted 6 days post-emergence from the treated water. This demonstrates learning and memory in the mosquito *Ae.*

aegypti, with implications for dengue vector surveillance and control.
PMID: 14651662 [PubMed - indexed for MEDLINE]

[J Econ Entomol.](#) 2003 Jun;96(3):817-25.

Systemic effects of neem on western flower thrips, *Frankliniella occidentalis* (Thysanoptera: Thripidae).

[Thoeming G](#), [Borgemeister C](#), [Sétamou M](#), [Poehling HM](#).

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http://www.ncbi.nlm.nih.gov/pubmed/12852622?ordinalpos=11&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

The systemic effects of neem on the western flower thrips, *Frankliniella occidentalis* (Pergande), were investigated in laboratory trials using green bean, *Phaseolus vulgaris* L., in arena and microcosm experiments. In arena experiments, systemic effects of neem against western flower thrips larvae on primary bean leaves were observed with maximum corrected mortality of 50.6%. In microcosm experiments using bean seedlings, higher efficacy in the control of western flower thrips were observed with soil applications of neem on a substrate mixture (i.e., Fruhstorfer Erde, Type P, and sand) in a 1:1 ratio (93% corrected mortality) compared with application on the commercial substrate only (76% corrected mortality). However, longer persistence of neem was observed with soil application on the commercial substrate, which showed effects against thrips for up to 6 d after application. In addition to systemic effects observed on all foliage-feeding stages of western flower thrips, mortality on contact and repellent effects were observed on soil-inhabiting stages after soil applications of neem. Finally, bean seedlings grown from seeds pregerminated for 3 d in neem emulsion were also toxic to western flower thrips.

PMID: 12852622 [PubMed - indexed for MEDLINE]

[Phytother Res.](#) 2003 Mar;17(3):202-5.

Field trials on the repellent activity of four plant products against mainly *Mansonia* population in western Ethiopia.

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http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12672146&query_hl=1&itool=pubmed_docsum

The repellent activity of essential oils of lemon eucalyptus (*Eucalyptus maculata* citrodion), rue (*Ruta chalepensis*), oleoresin of pyrethrum (*Chrysanthemum cinerariaefolium*) and neem (*Azadiracta indica*) have been field tested as 40%, 50% and 75% solutions in coconut oil against populations of mosquitoes consisting mainly of *Mansonia* in Gambella, western Ethiopia. A latin square design was used to randomize the test subjects for possible individual differences for mosquito attraction. Repellency was evaluated as the percentage protection. Deet was included in the study for comparison. All the plant products manifested repellency.

At 50% concentration at which the highest repellency was recorded the protection was 91.6%, 87.0%, 96.0%, 97.9% for rue, neem, pyrethrum and deet, respectively. The essential oil of lemon eucalyptus was not tried at this concentration. At a 40% concentration deet, lemon eucalyptus and pyrethrum were significantly ($p < 0.05$) more effective than rue and neem. At a 50% concentration, deet and pyrethrum were significantly better ($p < 0.05$) than rue and neem. At a 75% concentration concentration, deet and lemon eucalyptus performed significantly better ($p < 0.05$) than pyrethrum and neem. The difference between pyrethrum and neem was also significant ($p < 0.01$). Copyright 2003 John Wiley & Sons, Ltd.
PMID: 12672146 [PubMed - indexed for MEDLINE]

[J Am Mosq Control Assoc.](#) 2002 Jun;18(2):107-10.

Field evaluation of three plant-based insect repellents against malaria vectors in Vaca Diez Province, the Bolivian Amazon.

[Moore SJ](#), [Lenglet A](#), [Hill N](#).

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http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12083351&query_hl=1&itool=pubmed_docsum

The efficacy of repellents against *Anopheles darlingi*, the main malaria vector in Bolivia, was evaluated. This mosquito has a peak in biting activity early in the evening. Three natural repellents (1 eucalyptus based, 1 neem based, and 1 containing several repellent essential oils) were tested in comparison with 15% deet in human landing catches in Bolivia. The eucalyptus-based repellent containing 30% p-menthane-diol applied at a dose similar to those used in practice gave 96.89% protection for 4 h. Deet gave 84.81% protection. The other 2 products did not provide significant protection from mosquito bites.

Publication Types: [Evaluation Studies](#)

PMID: 12083351 [PubMed - indexed for MEDLINE]

[Indian J Malariol.](#) 2002 Mar-Jun;39(1-2):13-7.

Evaluation of repellent action of neem oil against the filarial vector, *Culex quinquefasciatus* (Diptera: Culicidae).

[Ravindran J](#), [Eapen A](#), [Kar I](#).

Malaria Research Centre (Field Station), 1304, Annanagar Western Extension, Chennai-600 050, India.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=14686105&query_hl=26&itool=pubmed_docsum

Studies were carried out to evaluate the repellent action of neem oil against *Culex quinquefasciatus*. Application of 2 and 5 per cent neem oil @ 5 ml/person/night gave 50 and 40.9 per cent protection in indoor collections and 17.4 and 5.6 per cent in outdoor collections as compared with that of untreated control respectively. The protection time ranged from 0100 to 0300 hrs and 0100 to 0600 hrs in indoor and outdoor collections respectively. Results of repellent action of Autan, a synthetic mosquito repellent studied concurrently showed a

relatively higher protection rate from the bites of *Cx. quinquefasciatus*.

Publication Types: [Clinical Trial](#)

PMID: 14686105 [PubMed - indexed for MEDLINE]

[J Commun Dis](#). 2001 Sep;33(3):180-4.

Relative efficacy of DEPA and neem oil for repellent activity against *Phlebotomus papatasi*, the vector of leishmaniasis.

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http://www.ncbi.nlm.nih.gov/pubmed/12206037?ordinalpos=13&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

The insect repellent N, N-diethylphenyl acetamide (DEPA) was compared with neem oil, a commercial preparation, for protection against 3 day old un-fed female of the sandfly, *Phlebotomus papatasi*, (Diptera: Psychodidae) under laboratory conditions on mouse. The percentage protection against sandfly bite provided by neem oil was significantly higher than DEPA when applied at 1% and 2% concentrations ($p = 0.000$, $t = 21.474$; $df = 6$ and $p = 0.001$, $t = 5.960$; $df = 6$ respectively). However, neem oil did not show any significant difference with DEPA at 5% ($p = 0.1682$, $t = 0.15667$; $df = 6$). This clearly indicates that at higher concentration (5%) both neem oil and DEPA exhibited similar repellent action against *P. papatasi*.

PMID: 12206037 [PubMed - indexed for MEDLINE]

[J Insect Sci](#). 2001;1:6. Epub 2001 May 15.

Responses of two ladybeetles to eight fungicides used in Florida citrus: implications for biological control.

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http://www.ncbi.nlm.nih.gov/pubmed/15455066?ordinalpos=7&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

Two ladybeetles, *Cycloneda sanguinea* and *Harmonia axyridis*, were exposed in the laboratory to eight fungicide formulations commonly used in citrus production in Florida. Both benomyl and the combination of copper and petroleum oil proved toxic to larvae of *C. sanguinea* that were exposed to concentrations corresponding to recommended field rates, either as leaf residues or in topical spray applications. Larvae of *C. sanguinea* also suffered significant mortality when exposed to neem oil as a leaf residue, but not after topical application. Larvae of *H. axyridis* exposed to these compounds completed development with the same success as control larvae in all trials. However, *H. axyridis* larvae exhibited slower development following exposure to leaf residues of ferbam applied at twice the recommended rate. Exposure to azoxystrobin as a leaf residue at twice the recommended concentration resulted in accelerated larval development in both species. No compounds appeared repellent to adult beetles of either species. Adult beetles of both species were observed resting on portions of filter paper treated

with fosetyl-Al more often than on untreated, control portions. Azoxystrobin, ferbam and mefenoxam similarly arrested the movement of adult *C. sanguinea*, whereas benomyl and the copper and petroleum oil combination arrested the movement of adult *H. axyridis*. The differential sensitivity of the two coccinellid species is discussed in the context of the potential displacement of the indigenous *C. sanguinea* by the invasive *H. axyridis*.
PMID: 15455066 [PubMed - indexed for MEDLINE]

[Ying Yong Sheng Tai Xue Bao](#). 2000 Feb;11(1):108-10.

[Evaluation of plant protectants against pest insects]

[Article in Chinese]

[Pang X](#), [Zhang M](#), [Hou Y](#), [Jiao Y](#), [Cen Y](#).

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http://www.ncbi.nlm.nih.gov/pubmed/11766564?ordinalpos=15&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

An interference index of population control (IIPC) was constructed for investigating the complex effects of plant protectants, including the effects of repelling insect pests away from the plant, deterring the egg laying of adults and the continuation of feeding, and causing death by toxicity. At the same time, indicated by IIPC, the alcohol extracts of some common plants, such as *Eucalytus rubusta*, *Wedelia chinensis* etc. and the neem oil gave very good results to protect the plant against *Plutella xylostella*. The D-C-Tron NR Petroleum Spray Oil (CALTEX) also gave an excellent effect to protect citrus against red mite. All the experiments show the important role of the repellent effect on the pests.

PMID: 11766564 [PubMed - indexed for MEDLINE]

[J Commun Dis](#). 1999 Dec;31(4):241-5.

Field evaluation of herbal mosquito repellents.

[Das NG](#), [Nath DR](#), [Baruah I](#), [Talukdar PK](#), [Das SC](#).

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=10937301&query_hl=1&itool=pubmed_docsum

Repellent properties of *Zanthoxylum armatum* DC. Syn. *Z. alatum* Roxb. (Timur), *Curcuma aromatica* (Jungli haldi) and *Azadirachta indica* (Neem) oils were evaluated against mosquitoes in mustard (*Brassica* sp.) and coconut (*Cocos* sp.) oil base and compared with synthetic repellent. Dimethyl phthalate (DMP) as standard. Timur and jungli haldi afforded better protection in the both the base at all the concentrations. Tepellents in mustard oil gave longer protection time than those in coconut oil. At 0.57 mg/cm² concentration timur oil gave significantly higher protection both in mustard (445 min) as well as coconut oil (404 min) than the other repellents and DMP.

Publication Types: [Clinical Trial](#)

PMID: 10937301 [PubMed - indexed for MEDLINE]

[Vet Parasitol](#). 1998 Jan 31;74(2-4):289-97.

Effects of azadirachtin on *Ctenocephalides felis* in the dog and the cat.

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http://www.ncbi.nlm.nih.gov/pubmed/9561713?ordinalpos=17&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

Azadirachtin-containing neem seed extract is a powerful insect growth regulator, a feeding deterrent and repellent with low toxicity. Unfortunately, azadirachtin degrades rapidly in light, excessive heat or alkalinity. Evaluations of azadirachtin on ectoparasites on animals have been scarce. The purpose of this work was to describe the effects of normal and potentiated azadirachtin on *Ctenocephalides felis* in the dog or cat. Groups of kennelled greyhounds and domestic cats infested with *C. felis* were sprayed once with azadirachtin containing neem seed extract with or without diethyltoluamide (Deet) and/or citronella. Methanolic extracts with 200, 1000 or 2400 ppm azadirachtin reduced fleas in a dose-dependent manner. Compared with fleas counted on treated dogs just before treatment and untreated infested dogs, 1000-2400 ppm azadirachtin reduced fleas 93-53% for 19 days. However, combined with 500 ppm Deet and 33% w/v citronella, only 500 ppm azadirachtin reduced fleas 95-62% for 20 days. On cats inoculated with 50 fleas 2 days before treatment, the combination reduced fleas and eggs 100% to day 6 and 83-51% from day 7 to 9. On petri dishes, the combination achieved 100% egg mortality up to day 7 and 80% to day 14 and 48-52% to days 21-28. Deet, with or without neem seed extract or citronella, and citronella, with or without neem, did not reduce fleas significantly. The results show that azadirachtin reduced fleas in a dose-dependent manner in flea-contaminated environments. In cats, the combination killed most fleas within 24 h, providing effective flea control for 7 days. The results suggest that Deet with citronella potentiated the effect of azadirachtin on *C. felis*.

PMID: 9561713 [PubMed - indexed for MEDLINE]

[Indian J Malariol.](#) 1996 Sep;33(3):139-43.

Preliminary evaluation of safety aspects of neem oil in kerosene lamp.

Valecha N, Ansari MA, Prabhu S, Razdan RK.

Malaria Research Centre (ICMR), Delhi, India.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=9014397&query_hl=1&itool=pubmed_docsum

Kerosene lamps containing one per cent neem oil were used for mosquito repellent action in a village near Delhi. The safety aspects of this personal protection method developed by Malaria Research Centre were evaluated by animal studies and clinical examination of population before and after exposure. Single application of neem oil (1%) did not produce skin irritation in rabbits and adverse effect on guinea pigs after exposure to aerosol. Clinical examination of 156 adults and 110 children did not reveal any major adverse effects after one year of exposure to 1% neem oil.

PMID: 9014397 [PubMed - indexed for MEDLINE]

[Indian J Malariol.](#) 1996 Jun;33(2):99-102.

Use of neem cream as a mosquito repellent in tribal areas of central India.

[Singh N](#), [Mishra AK](#), [Saxena A](#).

Malaria Research Centre (Field Station), Jabalpur, India.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=8952174&query_hl=1&itool=pubmed_docsum

PMID: 8952174 [PubMed - indexed for MEDLINE]

[Indian J Malariol.](#) 1995 Sep;32(3):99-103.

Use of neem oil as a mosquito repellent in tribal villages of mandla district, madhya pradesh.

[Mishra AK](#), [Singh N](#), [Sharma VP](#).

Malaria Research Centre (Field Station), Medical College Building, Jabalpur, India.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=8936291&query_hl=1&itool=pubmed_docsum

A field study was carried out to evaluate the mosquito repellent action of neem (*Azadirachta indica*) oil in tribal forested villages of District Mandla. Various concentrations of neem oil mixed in coconut oil (1-4%) were applied to the exposed body parts of human volunteers. Results revealed 81-91% protection during 12 h period of observation from the bites of anopheline mosquitoes. Neem oil is an indigenous product and a practical solution to curtail mosquito nuisance.

PMID: 8936291 [PubMed - indexed for MEDLINE]

[Indian J Malariol.](#) 1995 Jun;32(2):47-53.

Repellent action of neem cream against mosquitoes.

[Dua VK](#), [Nagpal BN](#), [Sharma VP](#).

Malaria Research Centre (Field Station), BHEL, Ranipur, India.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=7589727&query_hl=1&itool=pubmed_docsum

Neem cream was used as mosquito repellent to provide protection against *Aedes albopictus*, *Ae. aegypti*, *Culex quinquefasciatus*, *Anopheles culicifacies* and *An. subpictus* mosquitoes. The application of neem cream on exposed body parts @2.0 gm/person showed 78 (range 65-95), 89 (range 66-100) and 94.4 (range 66-100) per cent protection against *Aedes*, *Culex* and *Anopheles* mosquitoes respectively. Significant difference was observed between neem cream treated and untreated group of population for *Aedes* mosquitoes ($p < 0.001$). Application of neem cream was found to be a safe and suitable alternative to insecticide impregnated coils for personal protection against mosquitoes and one application was 68% effective for four hours.

PMID: 7589727 [PubMed - indexed for MEDLINE]

[Southeast Asian J Trop Med Public Health.](#) 1995 Mar;26(1):180-2.

Field studies on the mosquito repellent action of neem oil.

[Sharma SK](#), [Dua VK](#), [Sharma VP](#).

Malaria Research Center (Field Station), BHEL Complex, Ranipur, Hardwar, India.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=8525409&query_hl=1&itool=pubmed_docsum

Repellent action of neem oil was evaluated against different mosquito species. 2% neem oil mixed in coconut oil provided 96-100% protection from anophelines, 85% from Aedes, 37.5% from Armigeres whereas it showed wide range of efficacy from 61-94% against Culex spp. Therefore, neem oil can be applied as a personal protection measure against mosquito bites.

Publication Types: [Clinical Trial](#) [Controlled Clinical Trial](#)

PMID: 8525409 [PubMed - indexed for MEDLINE]

[Indian J Malariol](#). 1994 Sep;31(3):122-5.

Field evaluation of mosquito repellent action of neem oil.

[Kant R](#), [Bhatt RM](#).

Malaria Research Centre (Field Station), Civil Hospital, Nadiad, India

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=7713267&query_hl=1&itool=pubmed_docsum

PMID: 7713267 [PubMed - indexed for MEDLINE]

[Southeast Asian J Trop Med Public Health](#). 1994 Sep;25(3):608-10.

Evaluation of neem oil as sandfly, *Phlebotomus papatasi* (Scopoli) repellent in an Oriental sore endemic area in Rajasthan.

[Dhiman RC](#), [Sharma VP](#).

Malaria Research Centre (ICMR), Delhi, India.

http://www.ncbi.nlm.nih.gov/pubmed/7777937?ordinalpos=22&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

PMID: 7777937 [PubMed - indexed for MEDLINE]

[J Med Entomol](#). 1994 May;31(3):505-7.

Personal protection from mosquitoes (Diptera: Culicidae) by burning neem oil in kerosene.

[Sharma VP](#), [Ansari MA](#).

Malaria Research Centre (ICMR), Delhi, India.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=7914543&query_hl=1&itool=pubmed_docsum

The repellent action of neem oil (extracted from the seeds of *Azadirachta indica* A. Juss) was evaluated on mosquitoes at two villages near Delhi, India. Kerosene lamps containing neem oil were burned in the living rooms, and mosquitoes resting walls or attracted to human bait were collected inside rooms from 1800 to 0600 h. Neem oil (0.01-1%) mixed in kerosene reduced

biting of human volunteers and catches of mosquitoes resting on walls in the rooms. Protection was more pronounced against Anopheles than against Culex. A 1% neem oil-kerosene mixture may provide economical personal protection from mosquito bites.

PMID: 7914543 [PubMed - indexed for MEDLINE]

[J Am Mosq Control Assoc.](#) 1993 Sep;9(3):364-6.

Neem oil as a sand fly (Diptera: Psychodidae) repellent.

[Sharma VP](#), [Dhiman RC](#).

Malaria Research Centre (ICMR), Delhi, India.

http://www.ncbi.nlm.nih.gov/pubmed/8245951?ordinalpos=25&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

The repellent action of neem oil was evaluated against sand flies under laboratory and field conditions. Concentrations of 2% neem oil mixed in coconut or mustard oil provided 100% protection against Phlebotomus argentipes throughout the night under field conditions; against Phlebotomus papatasi it repelled sand flies for about 7 h in the laboratory. Neem oil is an indigenous product and a low-cost alternative for personal protection against sand fly bites.

PMID: 8245951 [PubMed - indexed for MEDLINE]

[J Am Mosq Control Assoc.](#) 1993 Sep;9(3):359-60.

Mosquito repellent action of neem (Azadirachta indica) oil.

[Sharma VP](#), [Ansari MA](#), [Razdan RK](#).

Malaria Research Centre, Delhi, India.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=8245950&query_hl=1&itool=pubmed_docsum

Two percent neem oil mixed in coconut oil, when applied to the exposed body parts of human volunteers, provided complete protection for 12 h from the bites of all anopheline species. Application of neem oil is safe and can be used for protection from malaria in endemic countries.

PMID: 8245950 [PubMed - indexed for MEDLINE]

Most of this research data was compiled from the National Library of Medicine at the National Institutes of Health website (www.pubmed.com) and is presented here as a service. Using Neem does not sell neem products.