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# Handmade Organic Mosquito Repellent (HOMeR)

The abandoned ricefields in our valley breed hordes of fierce mosquitoes, and at dusk they attack in force. But it's hard to tell which is worse, the mosquitoes or the commercial repellents.



Two weeks earlier we cut this lemon grass to the height of Midori's hand

The mosquitoes are horrific -- they're highly aggressive, you can be bitten hundreds of times without protection, it's torture, impossible to bear.

But the commercial repellent sprays mostly use diethyl-meta-toluamide (DEET), a nasty chemical that can cause rashes, swelling, eye irritation, and worse problems, though they're unusual -- including brain swelling in children, anaphylactic shock, low blood pressure, and one report of death. It hasn't had any of those effects on us (yet), but it's horrible stuff to have on your skin -- and with these mosquitoes you have to cover every single square inch of exposed skin. They'll even bite you right through a T-shirt or socks.

The alternative is incense coils, which you burn -- they fill the air with smoke containing insecticides. And indeed the mosquitoes keep away. We think this is very wise of them -- we don't like the coils any more than they do.

We tried all the herbal preparations, but they just don't work -- these mosquitoes are fierce!

So what to do? It's both an immediate problem and a longer-term one for us -- Journey to Forever will be travelling through many mosquito-infested and malarial areas.

We've found one good answer. We planted three stalks of **Thai lemon grass** (*Cymbopogon citratus*) we got from the local supermarket, and after a few months they'd grown into a composite clump about 15" across. We used a lot of stalks for cooking, but the clump didn't seem to get any smaller. We cut the tops every couple of weeks because it shaded out the other herbs in the herb bed (lots of green stuff for the compost), but it quickly grew back. And we found it keeps the mosquitoes away. It contains citronella oil, a safe and natural insect repellent that's just as effective as the commercial chemical products, especially when it's fresh. In fact lemon grass contains more than just citronella oil and is more effective than true citronella.

Rubbing the long, grassy leaves on the skin worked well, but the stalk worked even better. Take one stalk of fresh lemon grass (grip it near the ground and give it a sharp sideways tug to break it off from the clump), peel off the outer leaves, snap off the grass blades behind the swollen stem at the base. Bend the

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Handmade Projects

Ichijima

Japan

stem between your fingers, loosening it, then rub it vigorously between your palms so that it fractures into a kind of fibrous juicy mass, and rub this mess over all exposed skin, covering thoroughly at least once. Pleasant on the skin and effective: 98% protection at the Beach House at sundown, 100% any other time, and the effect lasts about 4-5 hours. In most places, where the mosquitoes are less fanatical, you can use less and it'll last longer.

We tried making tinctures so we could spray it, and this worked just as well.

## To make HOMeR

- sustainable: made entirely from locally available renewable resources
- empowering: processed entirely by the end-user as needed
- eco-friendly: won't boil the planet or blow a hole in the sky.

Chop up the cores of five or six stalks of lemon grass and put them in a blender with a tumblerful of spirits, blend thoroughly. Can be further diluted by adding up to half as much water.

We used whatever booze we could find in the booze cupboard (we hardly drink at all, but people keep giving it to us), and strained it into a sprayer. The extremely cheap Chinese brandy went first, the Absolut Swedish vodka worked even better and we didn't smell quite as much like winos, and then we used London Dry Gin. When we get round to distilling fuel ethanol, we'll use that.

The only problem is that it goes stale after about a week and loses effectiveness -- does anyone know why, or how to prevent it going stale?

Can you find a better way? Young scientists in schools can really help us with this -- and it's not just for our sake (see below).

These are some of the kinds of preparations you can make with herbs:

- tinctures
- infusions
- decoctions
- fluid extracts
- essential oils

See below for further details.

## Magic herb

Lemon grass is also an effective herbal anti-fungal medicine (lemongrass tea) and in Puerto Rico people use the fibrous stalks as a natural toothbrush! Clean and tingling fresh! (Try it!)

According to the **CRC Ethnobotany Desk Reference** by Tim Johnson, lemon grass (*Cymbopogon citratus*) is traditionally used in various parts of the world as an antiseptic, antispasmodic, carminative, cyanogenetic, dentrifice,

diaphoretic, diuretic, emmenagogue, expectorant, pectoral, preventative (cold), stimulant, sudorific, and tonic, used to treat common cold, consumption, cough, depurative, dyspepsia, elephantiasis, fever, flu, gingivitis, headache, hypertension, insecticide, leprosy, malaria, mouth sores, neuritis, pneumonia, pyorrhea, rheumatism, sprains, and toothache.

The Aromatic and Medicinal Plants Index at the **Purdue Guide to Medicinal and Aromatic Plants** has a lot of information on lemon grass, also listing it as an insect repellent and a medicinal plant, and says it's used in food and confections, in perfumes and cosmetics, soaps and creams, as a flavouring in soft drinks, and as a mask for industrial bad smells.

<http://www.hort.purdue.edu/newcrop/med-aro/factsheets/LEMONGRASS.html>

An altogether interesting plant -- like most plants, if not all of them. Other plant oils mosquitoes don't like are citronella, jojoba, neem, witch hazel, tea tree oil, peppermint, lemon basil, lemon oregano, lemon geranium, catnip, eucalyptus and pennyroyal.

Dr James A. Duke's **Phytochemical and Ethnobotanical Databases** lists lemon grass among 252 plants traditionally used as insecticides, 436 for malaria, 439 toothache, 58 for gum inflammation, 42 mouthwashes, 89 dentifrices, 15 for gum disease.

<http://www.ars-grin.gov/duke/index.html>

Three-quarters of modern medical drugs are plant-based. Most plant species haven't yet been studied for their potential medical benefits. Meanwhile thousands of plant species are lost forever each year because of deforestation and industrialized farming methods.

## The mosquito menace

Deforestation and industrialized farming are also two of the factors causing an alarming increase in the range of mosquitoes.

The World Health Organization says global warming is also expanding the range of mosquitoes that carry malaria, yellow fever, and dengue fever, putting millions more humans at risk. Malaria mosquitoes are appearing in upland areas where they've never been seen before.

A child dies of malaria every 12 seconds, mostly in the Third World.

"In the history of the world, more people have died from diseases transmitted by mosquitoes than from all the fighting in all the wars," says appropriate technology company Jade Mountain.

"The world's most dangerous animal is the mosquito," according to a BBC World Service health program: malaria now infects approximately 110 million



This large clump of lemon grass grew from three small stems

people annually, causing 2-3 million deaths, and with increasing drug resistance, the problem is worsening, while attempts to control the mosquitoes with pesticides have proved ineffective.

**Malaria Poses Bigger Threat Than Previously Believed** -- For more than 50 years, the mantra of "one million annual deaths due to malaria" has been cited by scientists and journalists. This estimate had gone unexamined in regard to its accuracy and economic implications. A new report, ""The Intolerable Burden of Malaria: A New Look at the Numbers", has found that at a minimum, between 700,000 and 2.7 million people die each year from malaria, more than 75 percent of them African children. Environment News Service, AmeriScan, August 2, 2001.

<http://ens.lycos.com/ens/aug2001/2001L-08-02-09.html>

The pesticides issue hit the headlines when an attempt to ban the use of the noxious and persistent insecticide DDT hit opposition from Third World countries which cannot afford the much more expensive alternatives.

<http://ens.lycos.com/ens/sep99/1999L-09-07g.html>

More about mosquitoes:

<http://www.ag.usask.ca/cofa/departments/hort/hortinfo/pests/mosquito.html>

**Mosquito Information** -- informative article by Tom Floore, American Mosquito Control Association, with illustrations: Mosquito Life Cycle, Mosquito Control, Mosquito-borne Diseases and more.

<http://www.mosquito.org/mosquito.html>



## Alternatives

So, everywhere, the search is intensifying for safe, cheap, effective, locally available alternatives to pesticides and to the malaria drug treatments that no longer work. In other words, plants.

Chinese scientists extracted an anti-malarial drug from the **Artemisia annua** fern, traditionally used against malaria for hundreds years. It is being used in Southeast Asia, Latin America and Africa and is proving effective against drug-resistant forms of malaria.

In India, a homemade mosquito repellent is proving particularly effective against the Anopheles mosquito which spreads malaria. It's made from low-cost neem oil from the amazing **neem tree** (*Azadirachta indica*, the "Village Pharmacy") mixed with coconut oil in concentrations of 1-2%.

<http://www.theoriginalneemcompany.com/Misc/insectrepellent.asp>

Neem is also proving effective against malaria itself, not just the mosquito that carries the parasite.

<http://www.theoriginalneemcompany.com/usespages/page2/malaria.htm>

One active component of the plant, gedunin, is said to be as effective as

quinine on malaria-infected cell cultures.

<http://www.theneemtree.com/medicinals4.htm>

### **The Neem Tree - A Tree for Solving Global Problems**

<http://www.theneemtree.com/>

Also in India, researchers have found that **peppermint** oil could be a new, cheap weapon in the fight against mosquito-borne diseases such as malaria, filariasis, dengue fever and West Nile virus. The oil not only repels adult mosquitoes but also kills the larvae. It was particularly effective against the *Anopheles culicifacies* mosquito, which is responsible for around three-quarters of malaria transmissions in the northern plains of India. -- BBC News, November 17, 1999

[http://news.bbc.co.uk/hi/english/health/newsid\\_524000/524811.stm](http://news.bbc.co.uk/hi/english/health/newsid_524000/524811.stm)

Another promising candidate is catnip.

### **Catnip Repels Mosquitoes More Effectively Than DEET --**

Researchers report that nepetalactone, the essential oil in catnip that gives the plant its characteristic odor, is about ten times more effective at repelling mosquitoes than DEET -- the compound used in most commercial insect repellents... A patent application for the use of catnip compounds as insect repellents was submitted last year by the Iowa State University Research Foundation. Funding for the research was from the Iowa Agriculture Experiment Station. -- American Chemical Society, 28 Aug 2001

<http://www.sciencedaily.com/releases/2001/08/010828075659.htm>

But: "I can't escape the idea that something is fundamentally wrong with these scientists. I learned about the mosquito repellent properties of catnip (*Nepeta cataria*) from my grandmother when I was a mere babe. Now these scientists have patented this century-old common folk knowledge." -- John, Organic Gardening Discussion List, 29 Aug 2001

What old folklore does YOUR grandmother know that might turn out to be more scientific than the scientists?

**Biocontrol Network** -- Biocontrol Reference Center, Products, Pest Guide, Discussion Board, FAQs -- Beneficial Insects and Organisms, Fly Control, Botanicals, Disease Control, Traps & Lures, Crawling Insect Control, Flying Insect Control, Bird Control, Creature Control, Soil Testing, Organic Fertilizers & Plant Foods, Composting, Seeds & Cover Crops, Lawn Care / Weed Control, Tools & Equipment, Pond and Septic Treatments, Home Care, Personal Care, Pet Supplies.

<http://www.biconet.com/index.html>

## **Forms of Medicinal Preparations**

### **Infusions**

These preparations are generally made of ground or bruised roots, barks, herbs, or seeds, by pouring boiling water over the drug, letting it stand for half-an-hour, occasionally stirring, and finally straining the clear liquid

carefully off. Sometimes cold water may be used, as in the case of a few bitters, such as Calumba, Quassia, &c., when the ground drug will be found to yield its properties to water without heat. The usual quantity of drug to a pint of water is 1 ounce, but in a few cases where the drugs contain very active principles, less is sufficient. The dose of most infusions varies from a tablespoonful to a wineglassful or a teacupful.

### **Decoctions**

As a rule decoctions are made by pouring cold water upon the cut, bruised, or ground drug, the mixture being boiled for twenty minutes to half-an-hour, cooled, and strained. Roots and Barks are generally treated in this manner, as they need longer subjection to heat to extract their virtues. Decoctions are generally made in a strength of 1 ounce to the pint, but, as the water boils away, it is best to use a pint and a half, and the decoction should then when finished measure 1 pint. The length of time depends upon the readiness with which the drug gives up its active principles to the liquid. The dose varies from two teaspoonfuls to a wineglassful or two.

### **Fluid Extracts**

These are most popular and convenient preparations, inasmuch as they, if properly made, are the most concentrated fluid forms in which vegetable drugs may be obtained. Fluid extracts are made in a variety of ways -- evaporation by heat, in *vacuo*; cold percolation; high pressure, &c. -- each drug being treated in that manner by which its properties may be best extracted and held in concentrated solution. The strength of a Fluid Extract is 1 in 1, or 1 ounce fluid represents 1 ounce of crude drug -- for instance, 1 ounce of Fl. Ext. Golden Seal would represent the medicinal value of 1 ounce of Golden Seal Root. Fluid Extracts are daily becoming more popular, and, as they may be easily obtained, bid fair to rival the Tinctures and Preparations which have made Homoeopathy so popular with those who seek an easy way of keeping a household stock of domestic remedies.

### **Solid Extracts**

Are prepared by evaporating to the consistence of honey the fresh juices or strong infusions of vegetable drugs. They may also be manufactured by a spirituous process, in which case the alcohol is recovered by means of distillation from a strong tincture of the drug. Solid extracts are employed chiefly in the manufacture of pills, plasters, ointments, and in more recent years also for compressed tablets.

### **Tinctures**

Are spirituous preparations made with pure or diluted spirits of wine of drugs containing gummy, resinous, or volatile principles, or of any drugs rendered useless by the application of heat in any form, or of the great number of drugs which will not yield their properties to water alone, as their active principles are more readily extracted by spirit, better held in solution and preserved from deterioration.

Tinctures are generally made in a strength of 1 or 2 ounces of drug to the pint.

The dose varies according to the active principles contained in the drug.

### **Concentrations**

Are a class of medicinal resins or resinoids obtained from medicinal drugs by precipitation from their alcoholic preparations, either by water, distillation, or other suitable means.

Those at present in use contain one or more, but not always all the therapeutic virtues of the drugs from which they are made, and in many cases are only powdered extracts.

-- from "**Potter's Cyclopaedia of Botanical Drugs and Preparations**", by R.C. Wren, F.L.S., Potter & Clarke, London, 2nd Edition, circa 1890.



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## LEMONGRASS

Family: Poaceae (Gramineae), *Cymbopogon* species

**Source:** Simon, J.E., A.F. Chadwick and L.E. Craker. 1984. Herbs: An Indexed Bibliography. 1971-1980. The Scientific Literature on Selected Herbs, and Aromatic and Medicinal Plants of the Temperate Zone. Archon Books, 770 pp., Hamden, CT.

Lemongrass, a perennial herb widely cultivated in the tropics and subtropics, designates two different species, East Indian, *Cymbopogon flexuosus* (DC.) Stapf., and West Indian, *Cymbopogon citratus* (DC. ex Nees) Stapf. East Indian lemongrass, also known as cochin or Malabar grass is native to India, while West Indian lemongrass is native to southern India and Ceylon. The lemongrasses are cultivated commercially in Guatemala, India, the People's Republic of China, Paraguay, England, Sri Lanka, and other parts of Indochina, Africa, Central America, and South America (11.1-73). The plant grows in dense clumps up to 2 meters in diameter and has leaves up to 1 meter long.

The reported life zone for lemongrass is 18 to 29 degrees centigrade with an annual precipitation of 0.7 to 4.1 meters with a soil pH of 5.0 to 5.8 (East Indian) or 4.3 to 8.4 (West Indian) (14.1-9). The plants need a warm, humid climate in full sun. They grow well in sandy soils with adequate drainage. Since the plants rarely flower or set seed, propagation is by root or plant division. The plants are harvested mechanically or by hand about four times each year with the productive populations lasting between four and eight years (14.1-9). Extensive breeding programs have developed many varieties of lemongrass.

The quality of lemongrass oil is generally determined by the content of citral, the aldehyde responsible for the lemon odor. Some other constituents of the essential oils are -terpineol, myrcene, citronellol, methyl heptenone, dipentene, geraniol, limonene, nerol, and farnesol (14.1-9). West Indian oil differs from East Indian oil in that it is less soluble in 70 percent alcohol and has a slightly lower citral content (14.1-9).

Lemongrass is used in herbal teas and other nonalcoholic beverages in baked goods, and in confections. Oil from lemongrass is widely used as a fragrance in perfumes and cosmetics, such as soaps and creams. Citral, extracted from the oil, is used in flavoring soft drinks in scenting soaps and detergents, as a fragrance in perfumes and cosmetics, and as a mask for disagreeable odors in several industrial products. Citral is also used in the synthesis of ionones used in perfumes and cosmetics (11.1-73, 14.1-9).

As a medicinal plant, lemongrass has been considered a carminative and insect repellent. West Indian lemongrass is reported to have antimicrobial activity (1.8-84, 1.8-130). Oil of West Indian lemongrass acts as a central nervous system depressant (7.6-187). Oil of East Indian lemongrass has antifungal activity (1.8-132). The volatile oils may also have some pesticide and mutagenic activities (11.1-96, 11.1-136).

*Cymbopogon nardus* is a source of citronella oil. *Cymbopogon martinii* is reportedly toxic to fungi (1.8-53).

Lemongrass is generally recognized as safe for human consumption as a plant extract/essential oil (21 CFR section 182.20 [1982]).

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## Care and Maintenance of Your Highly Complex Machinery through Internal Cleansing

[by Leonard Smith, MD](#)



Would you ever drive a vehicle for a full year without changing the oil and oil filter. How about 5 yrs? 10 yrs? More? **OF COURSE NOT!!**

If we did, we'd be driving a gunked up vehicle the oil would have turned so viscous that it would clog the engine robbing it of important lubrication and decreasing its efficiency and maybe even ruin the engine. What if I told you that the odds are that this is exactly what you have been doing to your body! Would you be surprised? Have you ever thought about it?

Many physicians will tell you that your health begins in your liver and intestinal tract and many of us can think of better things to talk about than bodily functions so we ignore it like we often do when we drive our vehicle too long between oil changes!

## **WHY IT IS SO IMPORTANT**

Unlike an ignored engine, our complex digestive and elimination systems are more important and should never be compromised. According to the National Center for Health Statistics almost 45 million visits to ambulatory care facilities annually are the result of diseases of the digestive system. Excluding skin cancer, colorectal cancer is the third most diagnosed cancer in the United States and Canada (after lung and breast in women, and lung and prostate in men) and 9 out of 10 occur past the age of 50.

We are living in an increasingly more toxic environment and the numbers of preservatives, artificial coloring, plastics, heavy metals (lead and mercury etc.), and even pesticides in our over-processed microwaved foods leave us in a precarious situation. We also continue to breathe toxic air, drink polluted water and food, and are subjected to pathogenic bacteria and viruses and yet we survive. That is a testament to our complex, living system.

Sometimes we are like a Ferrari operating on only two cylinders with clogged filters, but managing to still be in the race. What's that? Enough of the automobile analogy you get the point? Well alright but I'm deadly serious when it comes to understanding your digestive and elimination systems and in keeping them in good working order.

## **AGE MAKES A DIFFERENCE**

When we are young, our bodies are very resilient (with healthy detoxification pathways), and we recover quite nicely from abusing it. As we age, we experience aches and pains, chronic disease, and other health challenges which are directly attributable to lifestyle and diet issues and include our inability to properly eliminate and detoxify our bodies. Elimination of waste and improved function of our colon and liver are two important channels of elimination and are the subject of this article.

Infants have a bowel movement after most meals as do animals in nature, but as we become adults the accumulation of toxins and dysfunction of our system slows down our ability to eliminate waste and absorb the nutrients out of what we eat. In other words, we cannot take advantage of the high octane fuel we are putting in our body.

## **A SHORT LESSON**

Many of you may remember from school that the 20 foot long intestinal tract has tens of thousands of fingerlike projections called villi. These villi arise from the intestinal surface and create a picture similar to the blades of grass in a lawn. When this is flattened out, your intestines could literally cover a full sized tennis court. When this specialized lining is healthy it absorbs digested nutrients and prevents passage of toxins, partially digested food, and bacteria, viruses, and parasites. If there is any damage (as with infections, too much alcohol or sugar, food sensitivities, and sluggish elimination), then this can result in what is known as leaky gut syndrome (absorbing that which is unhealthy). This increased intestinal permeability then puts major stress on the body's #1 filter, the Liver. We now know this condition is a major contributor to many conditions such as, Chronic Fatigue Syndrome, Fibromyalgia, Migraine headaches, Irritable bowel Syndrome, and arthritis to name just a few.

## SOME SIMPLE STEPS

There are many adjustments to our systems that can be beneficial to our health, but let's start with four simple steps:

- 1. Cleansing of the colon and liver is a major starting point. Most people are not aware that their liver as well as the colon can be constipated! Enhancing liver and colon function and elimination is the first vital step. Such a cleansing can do much to increase our energy and overall health and well being.
- 2. Fiber. Certainly we get fiber in our diet, but not enough! A minimum of 20-30 grams per day is needed. Fiber scrubs our system, binds and eliminates excess cholesterol and other toxins, and provides food for the friendly bacteria.
- 3. Probiotics (healthy flora needed in our intestinal track) are extremely important. Dr. Eli Metchnikoff (Noble Prize winner 1908), said the #1 anti-aging strategy is eating the correct bacteria. Today 95 years later, I believe research in mainstream medicine will soon prove he may be right. It has been estimated that we have about 70 trillion cells, and closer to 100 trillion bacteria in our bodies! It looks like we are a bus for our bacteria, thus we would be wise to choose carefully who we invite onboard. Many things harm our helpful bacteria (alcohol, sugar, drugs, antibiotics, etc.) and allow pathogenic (bad) bacteria, fungi and parasites to take over. Thus the lactobacilli and bifidobacteria (friendly) must be re-populated if our digestive system is to function properly. They are our natural source of many of our vitamins, they help us to digest our food, they manufacture fatty acids to feed and protect the colon, and crowd out and kill the pathogens.
- 4. Oil Change. The proper oils are critical to health. We have too many saturated and trans fats (fake fat) and Omega 6. Even though Omega 6 is an essential fat or oil (not made by the body), it is far in excess of Omega 3, the other essential oil. The balance 100 years ago was 4:1, Omega 6:Omega 3, now some data suggests it is 25:1! That is a huge imbalance, that is leading to everything from heart disease to cancer. We must ingest daily the right oils in the right ratios. Essential fatty acids are needed by the brain, joints, cells, and cardiovascular and nervous systems to name a few. This also is a major anti-aging strategy.

In Summary, If I only could do only four things for my digestive health and anti-aging it would be: cleansing and care of the liver and colon, eat the friendly bacteria, and consume only the best of oils and fiber on a regular basis. There is more of course, that can and should be done but this is an excellent start.

### A RECOMMENDED STARTER PROTOCOL for Cleansing (Every 3 months)

A simple protocol practiced every quarter will do wonders for the care of your intricate and complicated body. Here's what's recommended for your body tune-up:

[CleanseMax™](#) a two part internal cleansing system consisting of CleanseMax I a proprietary blend of herbs supporting cleansing of organs and other channels of elimination (liver, blood, lymph, kidneys, heart, lungs and skin) and Part II which supports cleansing of the bowel. After 30

days of cleansing your body with CleanseMax, then use the following for maintenance:

[OilMax™](#) An advanced essential fatty acid formula containing essential fatty acids and enzymes needed to digest them properly.

[FiberMax™](#) A blend of natural flax and borage seed fiber, probiotics, and amino acids. According to the National Institutes of Health 90 per cent of Americans consume less than half of the recommended 36-40 grams of fiber required for proper bowel function and transit time.

[Floramax™](#) A unique probiotic supplement containing bacteria that are indigenous to the human digestive system, as well as amino acids and a prebiotic. Once you have used these products, you can begin to feel what a difference they can make in your energy levels, day to day health, and yes, even your memory!

### [Cleansing Protocol Package](#)



Advanced Naturals

Quantity

**US\$74.95**

### **DISCOUNT**

**Retail Value:** \$84.85

**Includes:** CleanseMax, OilMax, FiberMax (120) Capsules and FloraMax capsules.

### **AFTER THE BASICS**

The next step will be to understand the part that adequate water, sufficient enzymes and amino acids play in managing digestive conditions and what other methods of detoxification are important to overall health.

You'll want to explore these and additional supplementation methods on this site and subscribe to our newsletter which is published monthly. Rome wasn't built in a day and neither is adequate knowledge for improved wellness. This column is a good beginning but the first step is up to you. You'll be happy to see the results if you decide to take it and try our simple four step tune-up.

Yours in good health,

[Leonard Smith, M.D.](#)

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Wednesday, November 17, 1999 Published at 18:56 GMT

## Health

# Peppermint oil hits mosquito breeding



Peppermint oil may protect against mosquito bites

An extract of a common herb is being touted as a cheap alternative to existing pesticides in the war against mosquito-borne disease.

Peppermint oil is recommended by fans of alternative medicine to ease symptoms like indigestion, nausea and even to treat colds and flu, reports New Scientist magazine.

However, research by malaria experts suggest that the herb extract can not only repel adult mosquitoes, but kill their larvae before they even hatch.

Some experts say that peppermint oil could become a low-cost and more environmentally sensitive solution to eradicate the insects that carry potentially dangerous diseases such as malaria, filariasis, dengue fever and West Nile virus.

The team from the Malaria Research Centre in Delhi, India, extracted the oil from locally-grown peppermint, then tested it on the larvae of three mosquito species by spreading it in a film on water supplies.

Once the concentration had reached three millilitres per square metre of water, between 85% and 100% of the larvae died within a day, depending on their species.

In addition, volunteers doused in the oil were offered up as

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bait for mosquitoes, and found to be 85% protected.

The oil was particularly effective against *Anopheles culicifacies* which is responsible for approximately three-quarters of malaria transmitted in northern India.

### **Too much peppermint needed**

However, a London expert expressed doubt whether their findings could ever translate into a viable pesticide, as, at this dosage, the amount of plant required would be enormous to cover even a small area.

Far lower amounts of existing commercial pesticides would be required, said Christopher Curtis, from the London School of Hygiene and Tropical Medicine.

He said: "You would need tonnes of leaves to treat all the breeding sites around a village."

Malaria is still one of the world's biggest killers, responsible or partly responsible for as many as 2.7 million deaths each year, 90% of which are in tropical Africa.

It is caused by a parasitic organism called plasmodium which is passed on when an infected mosquito bites a human.

Although there are both preventative and curative medicines for the illness, malaria control programmes also focus on the treatment with insecticide of the habitats of malarial mosquitoes close to human settlements.

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## Catnip Repels Mosquitoes More Effectively Than DEET

CHICAGO, August 27 — Researchers report that nepetalactone, the essential oil in catnip that gives the plant its characteristic odor, is about ten times more effective at repelling mosquitoes than DEET — the compound used in most commercial insect repellents.

The finding was reported today at the 222nd national meeting of the American Chemical Society, the world's largest scientific society, by the same Iowa State University research group that two years ago discovered that catnip also repels cockroaches.

Entomologist Chris Peterson, Ph.D., with Joel Coats, Ph.D., chair of the university's entomology department, led the effort to test catnip's ability to repel mosquitoes. Peterson, a former post-doctoral research associate at the school, is now with the U.S. Department of Agriculture Forest Service, Wood Products Insects Research Unit, in Starkville, Miss.

While they used so-called yellow fever mosquitoes (*Aedes aegypti*) — one of several species of mosquitoes found in the United States — Peterson says catnip should work against all types of mosquitoes.

*Aedes aegypti*, which can carry the yellow fever virus from one host to another, is found in most parts of the United States. Yellow fever itself, however, only occurs in Africa and South America, according to the Centers for Disease Control. Vaccines and mosquito control programs have essentially wiped out the disease in the United States, although there have been isolated reports of unvaccinated travelers returning with the disease. The last reported outbreak in this country was in 1905.

Peterson put groups of 20 mosquitoes in a two-foot glass tube, half of which was treated with nepetalactone. After 10 minutes, only an average of 20 percent — about four mosquitoes — remained on the side of the tube treated with a high dose (1.0 percent) of the oil. In the low-dose test (0.1 percent) with nepetalactone, an average of 25 percent — five mosquitoes — stayed on the treated side. The same

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tests with DEET (diethyl-m-toluamide) resulted in approximately 40 percent to 45 percent — eight-nine mosquitoes — remaining on the treated side.

In the laboratory, repellency is measured on a scale ranging from +100 percent, considered highly repellent, to -100 percent, considered a strong attractant. A compound with a +100 percent repellency rating would repel all mosquitoes, while -100 percent would attract them all. A rating of zero means half of the insects would stay on the treated side and half on the untreated side. In Peterson's tests, catnip ranged from +49 percent to +59 percent at high doses, and +39 percent to +53 percent at low doses. By comparison, at the same doses, DEET's repellency was only about +10 percent in this bioassay, he notes.

Peterson says nepetalactone is about 10 times more effective than DEET because it takes about one-tenth as much nepetalactone as DEET to have the same effect. Most commercial insect repellents contain about 5 percent to 25 percent DEET. Presumably, much less catnip oil would be needed in a formulation to have the same level of repellency as a DEET-based repellent.

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Why catnip repels mosquitoes is still a mystery, says Peterson. "It might simply be acting as an irritant or they don't like the smell. But nobody really knows why insect repellents work."

No animal or human tests are yet scheduled for nepetalactone, although Peterson is hopeful that will take place in the future.

If subsequent testing shows nepetalactone is safe for people, Peterson thinks it would not be too difficult to commercialize it as an insect repellent. Extracting nepetalactone oil from catnip is fairly easily, he says. "Any high school science lab would have the equipment to distill this, and on the industrial scale it's quite easy."

Catnip is a perennial herb belonging to the mint family and grows wild in most parts of the United States, although it also is cultivated for commercial use. Catnip is native to Europe and was introduced to this country in the late 18th century. It is primarily known for the stimulating effect it has on cats, although some people use the leaves in tea, as a meat tenderizer and even as a folk treatment for fevers, colds, cramps and migraines.

A patent application for the use of catnip compounds as insect repellents was submitted last year by the Iowa State University Research Foundation. Funding for the research was from the Iowa Agriculture Experiment Station.

Chris Peterson, Ph.D., is a former post-doctoral research associate at Iowa State University in Ames, Iowa, and is now a Research Entomologist with the U.S. Department of Agriculture Forest Service, Wood Products Insect Research Service, in Starkville, Miss.

Joel R. Coats, Ph.D., is professor of entomology and toxicology and Chair of the Department of Entomology at Iowa State University in Ames, Iowa.

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*This story has been adapted from a news release issued by American Chemical Society.*

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