Neem (Azadirachta indica)

Slutarbete inom Traditionell Kinesisk Medicin

I Indien och Afrika finns ett träd som kallas "miraklernas träd" eller "De 40 sjukdomarnas träd" (Swahili: Mwarobaini) ï ett levande apotek. Trädet kallas även Nim-, Neem eller Margosaträdet och är en mahognysläkting.
På Kinesiska kallas trädet 印度苦楝樹 (Yìndù kтliàn shù).

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Innehållsförteckning

Neem (Azadirachta indica)

Slutarbete inom Traditionell Kinesisk Medicin

Inledning

Neemträdet (Azadirachta indica) har varit känt inom såväl den Indiska som Afrikanska traditionella medicinen under lång tid, men det är först under senare år som den västerländska medicinen och insektsbekämpningsindustrin fått upp ögonen för trädet och dess många användningsområden.

Neemträdet hör till mahognyträdens familj Meliaceae[i] och växer i tropiska och subtropiska områden. Trädet växer i temperatur-områden från 4°C till 45°C och trivs gärna i höglänta områden med bördig mark.

Så gott som alla delar av trädet kan användas medicinskt eller industriellt.

Neem enligt västerländsk medicin

En sökning på den medicinska forskningsdatabasen PubMed[ii] gav 23.12.2012 följande resultat:

PubMed:	Neem Tree	776 träffar.
	Neem Oil	212
	Neem Malaria	46
	Neem HIV	6
	Neem Male Contraception	25
	Neem AND pesticide OR Neem AND insecticide	229

Tabellen ovan visar att det pågår en ivrig forskning kring Neem och dess olika substansers verkan. Flera av forskningsområdena är helt nydandande och mycket hoppingivande. Bland annat användningen av Neem inom vård av cancer, HIV och som preventivmedel för män är användningsområden som radikalt skulle kunna ändra på

Faktaruta

Neemträdet kan bli 25 meter hög på tio år och kan leva i upp till 200 år. Neem ett städsegrönt träd, ett träd som inte fäller sina löv. Man tar även tillvara på neemträdets bark och blad. Av dessa gör man extrakt som används både invärtes och utvärtes, till samma användningsområden som oljan.
Neemoljan framställs antingen genom kallpressning eller genom värmebehandling av fröna och därefter pressning. Förutom fettsyror, innehåller oljan andra ämnen som gör att den har en starkt antibakteriell effekt. Neem fungerar också väldigt läkande för hud med acnebesvär och psoriasis.

situationen i hela världen. (Från april 2012 till dec 2012 har antalet Neem Tree sökningar ökat med 70st)

De rikligast förekommande och mest studerade kemikalierna.

De nedan listade ämnena är de som forskningen hittills identifierat som de mest aktiva substanserna och de som har mest intressanta egenskaper ur medicinskt- och industriellt perspektiv.

Nimbin - antiinflammatorisk, febernedsättande, antihistamin, anti-svamp.[iii]

Nimbidin - antibakteriell, anti-ulcerös (magsår), anti-arytmi (hjärtrytmrubbningar), antisvamp.

Nimbidol - antituberkulos, anti-protozon (malaria), febernedsättande.

Gedunin - blodkärlsvidgande, anti-malaria, anti-svamp.

Sodium nimbinat - urindrivande, spermiedödande, anti-artrit (ledinflammation).

Quercetin - anti-protozon (malaria), antioxidant, antiinflammatorisk, antibakteriell.
Quercetin + cancer ger i skrivande stund 1439 träffar på PubMed!

Salanin - insektsrepellent.

Azadirachtin - insektsrepellent, motverkar insektsbett, anti-hormonell (cancer).

Läkemedel på marknaden idag.

Idag finns inga kommersiella läkemedel med Neemsubstanser på marknaden i väst. Men enligt www.neemfoundation.org ingår i Kina Neem i medicinen ñQuinahausaõ[iv] som malariaproyflax, en formula som även skall introduceras i Indien.

Medicinsk forskning[v]

Enligt vad som framgår av PubMed och olika internetsidor pågår en omfattande medicinsk forskning kring Neem, och flertalet av dessa publicerade forskningsresultaten visar att naturmedicinernas kunskap om växten väl stämmer överens med forskningen.

Olika Neempreparat visar sig ha dokumenterad positiv effekt på bl a leverskador, magsår, blodsocker (diabetes), kolesterolvärden, immunsystemet, oralhygienen, skabb, reducerar tumörer, är antiinflammatorisk, antiviral, antibakteriell och svampdödande, antidepressiv, fungerar som preventivmedel (även för män). En industriellt intressant egenskap hos Neem är dess insekts- och parasitdödande funktion. Denna egenskap är troligtvis mer ekonomiskt intressant än de medicinska egenskaperna, åtminstone ur ett kortsiktigare perspektiv, då den västerländska medicinen vanligtvis är något skeptisk att börja använda traditionella läkemedelsväxter.

Neem enligt Afrikansk medicin

Neem har använts inom den Afrikanska medicinen under långa tider och även idag är det allmänt känt bland lokalbefolkningen att Neemträdet har många hälsobefrämjande egenskaper. Idag verkar tyvärr användningen vara mindre än tidigare, mycket pga den västerländska medicinens övertagande.

Insekter, bakterier och parasiter dör i kontakt med Neem, men det är ofarligt för varmblodiga djur. Därför finns det aldrig några insekter i Neem trädet. På sjukhus i Öst Afrika (säkert på andra ställen också) hugger man kvistar av trädet och lägger i sjukhuskorridorerna för att driva bort myggor och flugor. HDRA:s presentationen[vi] - The Neem Tree ï tar i huvudsak fasta på trädets egenskaper att skydda gröda från parasiter under växtperioden och förvaring. Kort nämns även andra användningsområden inom medicinen. Min kusin (Maria Holmberg) som är agrolog och bor i Tanzania har nyligen framgångsrikt visat på Neemträdets parasitbekämpande egenskaper.

I Tanzania och Kenya används avkok på bladen som malariamedicin, och även som profylax i svagare dos. Min egen mor övergick till den traditionella profylaxmedicinen vid sitt senaste besök i Tanzania efter att hon fått svåra biverkningar av medicinen hon tagit tidigare. Jag känner även till en annan Svensk familj som bodde långa tider i Tanzania som enbart använde Neembladsavkok som malariaprofylax. Man använder även Mwarobainiträdets blad för behandling av andra febersjukdomar och sjukdomar i magen såsom diarré, magsår, magsmärtor etc.

I Mombasa, Kenya finns en tvålfabrik som gör en Neemtvål. Förutom vanlig rengörande effekt har denna tvål även medicinsk verkan och är mycket effektiv för behandling av bl.a. acne och utslag på huden.

Traditionellt har neemträdets virke, bark, löv och blommor använts mot alla slags sjukdomar inklusive flertalet hudsjukdomar. Man använder avkok på blad, olja eller tvål för behandling av psoriasis.

Tunna kvistar av Neemträdet används som ò tandborstarò Man tuggar på kvisten och barken.

Blad eller avkok på blad används vid förpackning av grödor i säckar eller krukor för att hindra invasion av ohyra i maten.

Bild 2. Neemträdets blommor

Neem enligt Ayurveda

Inom Ayurveda har Neemträdet använts i tusentals år och är en väldokumenterad medicinsk växt. Den Indiska medicinen karakteriserar Neem som bitter, skarp, sval, klarnar hetta, löser stagnationer och minskar inflammationer. Den används för att balansera Pitta och Kapha. För att lista några av de användningsområden som den moderna Ayurvedan där Neem indikeras kan nämnas:

Diverse magproblem, magsår, parasiter i tarmarna, hemorroider, leversjukdomar, feber, malaria, hosta, astma, tuberkulos, hudsjukdomar, inflammerade leder, blåskatarr, utebliven menstruation, diabetes, tumörer, ögoninflammationer och generella ögonproblem.

Kontraindikation: ökad Vata och graviditet

En del medicinala användningsområden nämns på dessa internetsidor[vii],[viii].

Neemträdets användningsområden[ix]

Så gott som alla delar av trädet kan användas. I bilagan framgår en mer komplett presentation.

Barken : Neem barken är sval, bitter, astringerande, skarp i smaken och kylande. Den kan användas för trötthet, hosta, feber, dålig aptit och mask. Den läker sår och kan även användas vid uppkastning, hudsjukdomar och törst.

Bladen: Enligt flera Internetsidor och även den som Neemfoundation har, används bladen för behandling av neuromuskulär smärta vilket beskrivs som ett Vata problem. Detta är något motsägelsefullt då det anses att personer med Vataproblem inte skall ges torra, kalla, bittra öter. Neemblad som är mycket bittra, anses vara avgiftande, rena blodet och skydda från skadliga fria radikaler, samt läka ögonskjukdomar och neutralisera insektbett.

Frukterna: Neemfrukterna är bittra, renande, läka hemoroider och är maskdödade.

Blommorna: Neemblommorna används i Ayurvedan för att balansera Pitta och Kapha. De är adstringerande och maskdödande. Observera att här är det svårt att veta vad man menar med adstringerande, men troligtvis anses den västerländska meningen att vara sammandragande för till exempel vävnader vid sår (från latinets *adstringere*, sammandraga).

Frön: Neemfrön beskrivs som maskdödande, botar spetälska, ogiftiga och bittra i smaken.

Oljan: Neemoljan utvinns genom att krossa fröna och väldigt bitter. Oljan har ett mycket brett användningsområde.

Neem enligt Traditionell Kinesisk Medicin (TKM)

Neemträdets olika delar skiljer något från varandra och bör således presenteras separat. Men övergripande kan de olika delarna karakteriseras som: bittra, svala (kylande), fukt- och stagnationslösande samt parasitdödande.

Barken: Sval, bitter, skarp, kylande. Enligt Zhong Hong Lu, Bogotá, Colombia[x], som studerat TKM i över 50 år används avkok på barken och/eller roten tillsammans med vinäger för röda, ömma och svullna hudproblem.

Bladen: Mycket bittra, brett användningsområde bland annat för malariaprofylax, mag- och tarmproblem samt blodrelaterade problem med hetta.

Oljan: Mycket bitter, svalkande. Oljan har ett mycket brett användningsområde för såväl invärtes och utvärtes bruk. Personligen har jag sett oljans effektivitet på psoriasisutslag på armar, där 90% av utslagen försvann inom loppet av ungefär två veckors daglig smörjning med oljan.

Generellt är den bittra smaken är eldens, hjärtats smak, och då den samtidigt är kylande kan den klarna hetta i många organ. Att den fungerar som malariamedicin som enligt TKM är en Shaoyang sjukdom visar att den fungerar bra på Shaoyang nivå. Dess positiva verkan på magproblem tyder på en hettasvalkande effekt på mage och tarmar.

Neem torde kunna indikeras för Stagnation, Hetta, Hetta/Fukt och Hetta/Frossa (Shaoyang) typer av symptom. Användningen inom Afrikansk- och Indisk medicin visar på ett brett användningsområde såväl för invärtes- och utvärtes bruk.

Den bakteri-, virus-, och svampdödande egenskapen ökar ytterligare användningen för olika hettasymptom i Le, Ma, Ub, Tu, Tj, Hj och Blod (Xue). Man bör även komma ihåg att den används som parasitdödare utanför människokroppen inom lantbruket, både under odlings- och lagringsfasen av grödor och säd.

Användningen av trädets olika delar kan med fördel lånas från antingen den Afrikanska- eller Ayurveda medicinska traditionen.

Sammanfattning

Alla medicinska inriktningar är överens om Neemträdets positiva effekter på många svåra sjukdomstillstånd. Flera av dessa är dessutom svåra plågor i världens fattigare delar, där användningen av ett allmänt växande naturmedel kunde revolutionera folkhälsan. Vissa av trädets användningsområden så som insektsmedel, HIV och preventivmedel kunde hjälpa miljontals människor till en bättre vardag. Neemträdets egenskaper och forskningen kring dessa är förhoppningsvis ett steg i rätt riktning att integrera västerländsk medicin med de äldre traditionella medicinerna från olika delar av världen. Neemträdet kan komma att bli en räddning för många människor i fattiga områden där västerländsk medicin är otillgänglig, och man istället kan återgå till traditionen och ha ett växande apotek på den egna gården.

Dagens forskning kring Neemträdet är mycket intressant och kommer förhoppningsvis att på sikt leda till många positiva resultat som kommer att ge oss både nya läkemedel och en djupare insikt i trädets egenskaper, samt bekräfta många av de medicinska funktioner som såväl den afrikanska- och ayurvediska medicinen talat om i hundratals år redan.

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BILAGOR

Bilaga 1

Neem oil

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Neem Expeller Oil

Neem oil is a vegetable oil pressed from the fruits and seeds of the neem (*Azadirachta indica*), an evergreen tree which is endemic to the Indian subcontinent and has been introduced to many other areas in the tropics. It is the most important of the commercially available products of neem for organic farming and medicines.

Neem oil is generally red as blood, and has a rather strong odor that is said to combine the odours of peanut and garlic. It is composed mainly of triglycerides and contains many triterpenoid compounds, which are responsible for the bitter taste. It is hydrophobic in nature and in order to emulsify it in water for application purposes, it must be formulated with appropriate surfactants.

Azadirachtin is the most well known and studied triterpenoid in neem oil. The azadirachtin content of neem oil varies from 300ppm to over 2500ppm depending on the extraction technology and quality of the neem seeds crushed. Neem oil also contains steroids (campesterol, beta-sitosterol, stigmasterol).

Average composition of neem oil fatty acids		
Common Name	**Acid Name**	**Composition range**
Omega-6	Linoleic acid	6-16%
Omega-9	Oleic acid	25-54%
Palmitic acid	Hexadecanoic acid	16-33%
Stearic acid	Octadecanoic acid	9-24%
Omega-3	Alpha-linolenic acid	?%
Palmitoleic acid	9-Hexadecenoic acid	?%

Contents

Methods of extraction

The method of processing is likely to affect the composition of the oil, since the methods used, such as pressing (expelling) or solvent extraction are unlikely to remove exactly the same mix of components in the same proportions. The neem oil yield that can be obtained from neem seed kernels also varies widely in literature from 25% to 45%.

The oil can be obtained through pressing (crushing) of the seed kernel both through cold pressing or through a process incorporating temperature controls.

Neem seed oil can also be obtained by solvent extraction of the neem seed, fruit, oil, cake or kernel. A large industry in India extracts the oil remaining in the seed cake using hexane. This solvent-extracted oil is of a lower quality as compared to the cold pressed oil and is mostly used for soap manufacturing. **Neem cake** is a by-product obtained in the solvent extraction process for neem oil.

Uses

Neem oil is not used for cooking purposes. In India, it is used for preparing cosmetics (soap, hair products, body hygiene creams, hand creams) and in Ayurvedic, Unani and folklore traditional medicine, in the treatment of a wide range of afflictions. The most frequently reported indications in ancient Ayurvedic writings are skin diseases, inflammations and fevers, and more recently rheumatic disorders, insect repellent and insecticide effects.[1]

Traditional Ayurvedic uses of neem include the treatment of acne, fever, leprosy, malaria, ophthalmia and tuberculosis. Various folk remedies for neem include use as an anthelmintic, antifeedant, antiseptic, diuretic, emmenagogue, contraceptive, febrifuge, parasiticide, pediculocide and insecticide. It has been used in traditional medicine for the treatment of tetanus, urticaria, eczema, scrofula and erysipelas. Traditional routes of administration of neem extracts included oral, vaginal and topical use. Neem oil has an extensive history of human use in India and surrounding regions for a variety of therapeutic purposes. Puri (1999) has given an account of traditional uses and therapeutic indications and pharmacological studies of this oil, in his book on *neem*.

Formulations made of neem oil also find wide usage as a biopesticide for organic farming, as it repels a wide variety of pests including the mealy bug, beet armyworm, aphids, the cabbage worm, thrips, whiteflies, mites, fungus gnats, beetles, moth larvae, mushroom flies, leafminers, caterpillars, locust, nematodes and the Japanese beetle. Neem oil is not known to be harmful to mammals, birds, earthworms or some beneficial insects such as butterflies, honeybees and ladybugs if it is not concentrated directly into their area of habitat or on their food source. It can be used as a household pesticide for ant, bedbug, cockroach, housefly, sand fly, snail, termite and mosquitoes both as repellent and larvicide (Puri 1999). Neem oil also controls black spot, powdery mildew, anthracnose and rust (fungus).

Neem seed oil has also been found to prevent implantation and may even have an abortifacient effect similar to pennyroyal, juniper berries, wild ginger, myrrh and angelica. The effects were seen as many as ten days after fertilization in rats though it was most effective at no more than three

days. (Sinha, et al., 1984); (Lal et al., 1985). In a study on rats, neem oil was given orally eight to ten days after implantation of the fetus on the uterine wall. In all cases, by day 15, the embryos were all completely resorbed by the body. The animals regained fertility on the next cycle showing no physical problems. Detailed study of the rats revealed increased levels of gamma interferon in the uterus. The neem oil enhanced the local immune response in the uterus.(Mukherjee, 1996) Post coital use of neem oil as birth control does not appear to work by hormonal changes but produces changes in the organs that make pregnancy no longer viable (Tewari, 1989) (Bardham, 1991).

Toxicity

Studies done when Azadirachtin (the primary active pesticidal ingredient in neem oil) was approved as a pesticide showed that when neem leaves were fed to male albino rats for 11 weeks, 100% (reversible) infertility resulted.

Neem oil and other neem products such as neem leaves and neem tea should not be consumed by pregnant women, women trying to conceive, or children.

There is some evidence that internal medicinal use may be associated with liver damage in children.[2]

See also

- Neem
- Neem cake
- Azadirachtin

Footnotes

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Bilaga 2


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Bilaga 3

Neem

I Indien och Afrika finns ett träd som kallas "miraklernas träd" eller "De 40 sjukdomarnas träd" ï **ett levande apotek.** Trädet heter Nim-, Neem eller Margosaträdet och är en mahognysläkting. Finner du ett Neem träd så skall du söka skydd där. För där finner du ett träd som inte har några skadeinsekter, marken runt trädet är bördigt och luften under dess löv är frisk. Du kan alltid sova tryggt under ett neemträd. Ett neem träd är många gånger byns räddning då man kan använda alla delar av trädet.

Hur funkar Neem trädet, vad använder man?

Neemträdet kan bli 25 meter hög på tio år och kan leva i upp till 200 år. Neem ett städsegrönt träd, ett träd som inte fäller sina löv.
Man tar även tillvara på neemträdets bark och blad. Av dessa gör man extrakt som används både invärtes och utvärtes, till samma användningsområden som oljan.
Neemoljan framställs antingen genom kallpressning eller genom värmebehandling av fröna och därefter pressning. Förutom fettsyror, innehåller oljan andra ämnen som gör att den har en starkt antibakteriell effekt. Neem fungerar också väldigt läkande för hud med acnebesvär.

Användningsområden

Insekter, bakterier och parasiter dör i kontakt med Neem, men det är ofarligt för varmblodiga djur. Därför finns det aldrig några insekter i Neem trädet.
Traditionellt har neemträdets virke, bark, löv och blommor använts mot alla slags sjukdomar inklusive flertalet hudsjukdomar.

Neem oljan rekommenderas generellt för att användas i hudvård, medan löven används till skönhetsbehandling. Neemfröer, bark och löv är grunden till olika Neem extrakt.

Följande är de rikligast förekommande och mest studerade kemikalierna som finns i Neem-trädet:

Nimbin - antiinflammatorisk, febernedsättande, antihistamin, anti-svamp.
Nimbidin - antibakteriell, anti-ulcerös (magsår), anti-arytmi (hjärtrytmrubbningar), antisvamp.
Nimbidol - antituberkulos, anti-protozon (malaria), febernedsättande.
Gedunin - blodkärlsvidgande, anti-malaria, anti-svamp.
Sodium nimbinat - urindrivande, spermiedödande, anti-artrit (ledinflammation).
Quercetin - anti-protozon (malaria), antioxidant, antiinflammatorisk, antibakteriell.
Salanin - insektsrepellent.
Azadirachtin - insektsrepellent, motverkar insektsbett, anti-hormonell (cancer).

Bilaga 4

Neem nd Health

Neem has rightly been called sarvaroghari. Since time immemorial, Indians have learnt and made use of neem in a variety of ways both for personal and community health by way of environmental amelioration. Despite all the vicissitudes India has gone through over the centuries, neem has managed to remain a friend, philosopher and guide to an average Indian. It is time this heritage is appreciated and in area of promotional and preventive health care, our indigenous knowledge and resources are made use of on an increasing scale as low-cost, effective ingredient for the realization of the lofty goal of óHealth for allô.

As Naveen Patnaik (1993, p. 40) says, ñPossessed of many and great virtues, this native Indian tree has been identified on the five-thousand-year-old seals excavated from the Indus Valley Civilizationò. How the tradition lives on has also been graphically brought out, ñToday the margosa is valued more highly for its capacity to exercise the demon of disease than the spirit of the dead, and an image of the folk goddess Sitala can often be seen suspended from a margosa branch where she guards against small pox, once the great killer of the Indian country side. Renowned for its antiseptic and disinfection properties, the tree is thought to be particularly protective of women and children. Delivery chambers are fumigated with its burning bark (Margosa seed oil has been chemically tested as an external contraceptive, used by women as a spermicide). Dried margosa leaves are burned as mosquito repellent. Fresh leaves, notorious for their bitterness, are cooked and eaten to gain immunity from malaria.

Neemôs antiseptic properties are widely recognized now. ñNeem preparations are reportedly efficacious against a variety of skin diseases, septic sores, and infected burns. The leaves, applied in the form of poultices or decoctions, are also recommended for boils, ulcers, and eczema. The oil is used for skin diseases such as scrofula, indolent ulcers and ringworm.

Cures for many diseases have been reported but these need to be confirmed independently by trials under controlled conditions. Laboratory tests have shown that neem is effective against certain fungi that infect the human body. Some important fungi against which neem preparations have been found to be effective are: athleteôs foot fungus that infects hair, skin and nails; a ringworm that invades both skin and nails of the feet; a fungus of the intestinal tract; a fungus that causes infections of the bronchi, lungs, and mucous membranes and a fungus that is part of the normal mucous flora that can get out of control leading to lesions in mouth (thrush), vagina, skin, hands and lungs.

Neem has been used traditionally in India to treat several viral diseases. Even many medical practitioners believe that smallpox, chicken pox and warts can be treated with a paste of neem leaves ï usually rubbed directly on the infected skin. Experiments with smallpox, chicken pox, and fowl pox show that although neem does not cure these diseases, but it is effective for purposes of prevention. óCrude neem extracts absorb the viruses, effectively preventing them from entering unaffected cells.ò Recent tests, although unconfirmed, have shown that neem is effective against herpes virus and the viral DNA polymerase of hepatitis B virus. Should these findings be confirmed, neem could be used to cure these dreadful diseases.

Its effectiveness is enhanced on account of its easy and plentiful availability and low cost along with the advantage ï a big and critical advantage ï of crating income and employment for the poor. Neem is effective against dermatological insects such as maggots and head lice. It is a common

practice to apply neem all over the hair to kill head lice.

Rural inhabitants in India and Africa regularly use neem twigs as tooth brushes. Neem twigs contain antiseptic ingredients. That explains how these people are able to maintain healthy teeth and gums. Ayurveda describes neem as herbal drug which is used to clean the teeth and maintain dental hygiene. Neem in the form of powder is also used to brush teeth and massage gums.

Chagas disease is a major health problem in Latin America. It cripples millions of people there. Laboratory tests in Germany and Brazil show that neem may be an answer to this dreadful disease which so far remains largely uncontrollable. The disease is caused by a parasite which is spread by an insect called kissing bug. Extracts of neem have effects on the kissing bugs. Research has shown that ôfeeding neem to the bugs not only frees them of parasites, but azadirachtin prevents the young insects from molting and the adults from reproducingô.

In Ayurvedic medicine system neem is used to treat malarial fevers. Recent experiments have shown that one of the neemôs components, gedunin (a limonoid), is as effective as quinine against malaria. Malaria affects millions of people and is responsible for about 2 million deaths every year in India and several other countries. China has adopted neem in a big way for its anti-malaria operation. Their formulation ñQuinahausaò is going to become available in India as well. Neem oil treated mosquito nets and mosquito-repellent cheap tablets (one paise per tablet) are also becoming popular. Such mosquito nets presently available in the North-East have to be made available in the whole country (Swadeshi Patrika, chaitra-vaishak 2052). Because of growing problems of resistance to conventional treatments, it is becoming more and more difficult to control malaria. Should neem products prove effective cure against malaria, the dream of complete eradication of malaria might become a reality.

Neem is widely used for treating fevers. It has anti-pyretic (fever-reducing) property. In addition, neem products also have analgesic (pain-relieving) and anti-inflammatroy effects, i.e. for most common ailments neem can provide cheap, easily-available and local entrepreneurship medicines.

With revival of interest in Ayurveda as an important, indigenous total health-care system, neem with its therapeutic properties and time-tested usage, more particularly as a household first ï aid and safe self-administered medicine as well as a preventative help is bound to stage a big come back.

Dr. Suresh Chaturvedi (1995) has listed the uses of neem in pyrexia, diabetes, urinary problems, filarial, worms, respiratory disorders, dermatological disorders, gynecological disorders and by way of external use for eyes, piles and fistula, wounds, hair, dental hygiene and as fertility regulatory material; in addition to its ophthalmic and toiletries uses. However, there is a need for continued R & D and its transfer to the pharmaceutical industry.

A wide multitude of diseases or conditions can be successfully treated with various elements of neem.

Medical properties of Neem have been known to Indians since time immemorial. The Neem tree brings joy and freedom from various diseases.

Bilaga 5

Neem

Botanical name: *Azadirachta indica, Melia azadirachta*, Meliaceae

Other names: Neem (S), Vempu, Veppu (T), Neem, Margosa (E)

Botany: Neem is a medium to large evergreen tree, attaining a height of between 15 and 20 meters, with a straight bole, widely spreading branches, and grayish tubercled bark. The leaves are alternate and imparipinately compound, with 7-17 leaflets arranged in pairs, often with a terminal leaflet, ovate to lanceolate, sickle-shaped with an uneven base and serrate margins, 6-8 cm long, 1-3 cm wide. The flowers are cream to yellow in color, borne in axillary panicles, giving rise to a single seeded ellipsoid drupe that is greenish-yellow when ripe. Neem is widely cultivated in tropical and subtropical regions all over the world, and is thought to be native to the subcontinent (Warrier et al 1994, 227; Kirtikar and Basu 1935, 536-7).

Part used: Bark, leaves *(Nimbapatra)*, and seeds *(Nimbaphala)*.

***Dravyaguna**:*

- ***Rasa:*** *kashaya, tikta*
- ***Vipaka**: katu*
- ***Virya:*** *shita*
- ***Karma:*** *dipanapachana, vamana, purishasangrahaniya, krimighna, jvaraghna, chedana, dahaprashamana, raktaprasadana, kushtaghna, mutravirechana, sandhaniya, vishaghna, Pittakaphahara* (Srikanthamurthy 2001, 242; Warrier et al 1994, 227).

Constituents: Neem is a fairly well researched medicinal plant, and as a result a number of constituents have been isolated from it. Among these are bitter-tasting terpenes called limonoids, including azadirachtin, Neemnal, nimbidiol, margocin, margocinin and related compounds, as well as a variety of other terpenoids including isoazadirolide, nimbocinolide, gedunin, margosinone and nimbonone. More recently, researchers have isolated a series of tetranortriterpenoids including azadirachtol, 1alpha,2alpha-epoxy-17beta-hydroxyazadiradione, 1alpha,2alpha-epoxynimolicinol, and 7-deacetylnimolicinol. Other constituents include the flavonoids kaempferol, quercetin, quercitrin, rutin, and myricetin, as well as ?-sitosterol, a tannin, a gum, and a series of polysaccharides named CSP-II and -III, CSSP-I, -II, and -III, etc (Duke 2003; Malathi et al 2002; Hallur et al 2002; Williamson 2002, 57; Luo et al 2000; Kapoor 1990, 60).

Medical research:

Hepatotoxicity: The effect of aqueous leaf extract of *Azadirachta indica* was evaluated in paracetamol-induced hepatotoxicity in rats. The extract given in doses of 500 mg/kg (p.o.) significantly reduced elevated levels of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma glutamyl transpeptidase (gamma-GT). A hepatoprotective result was also observed macroscopically and histologically (Bhanwra et al 2000). The protective effect of Neem leaf was investigated on hepatic lipid peroxidation and antioxidant status during N-methyl-N'-nitro-N-nitrosoguanidine (MNNG)-induced gastric carcinogenesis in male Wistar rats. The

administration of the extract significantly lowered lipid peroxidation and enhanced the hepatic levels of glutathione and glutathione dependent enzymes (Arivazhagan et al 2000).

Ulcerogenesis: Researchers investigated the antisecretory and antiulcer effects of an aqueous extract of Neem bark. The extract was shown to dependently inhibit pylorus-ligation and drug (mercaptomethylimidazole)-induced acid secretion. It was also found to dose-dependently block gastric ulcer induced by restraint-cold stress and indomethacin. The extract was found to be similar to ranitidine and more potent than omeprazole in inhibiting pylorus-ligation induced acid secretion. In a stress ulcer model the Neem extract was found to be more effective than ranitidine but almost equal to omeprazole. The bark extract also displayed a gastroprotective effect in stress-induced ulcer by significantly preventing mucus and glutathione depletion. It prevented oxidative damage in the gastric mucosa by significantly blocking lipid peroxidation, and scavenged the hydroxyl radical, a causative factor for gastric ulcer. Overall, the extract was found to be more effective than previously identified antioxidants such as melatonin, vitamin E, desferrioxamine and alpha-phenyl N-tert butylnitrone (Bandyopadhyay et al 2002).

Hypoglycemic: A hypoglycemic effect was observed with an *Azadirachta indica* leaf extract and seed oil, in normal and alloxan-induced diabetic rabbits, although the effect was more pronounced in diabetic animals. Pretreatment with *A. indica* leaf extract or seed oil, started 2 weeks prior to alloxan, partially prevented the rise in blood glucose levels as compared to control diabetic animals (Kholsa et al 2000).

Cardiovascular: The effects of aqueous leaf extract of *Azadirachta indica* were evaluated on isolated prefused frog and rabbit heart. Researchers noted dose dependent negative inotropic and chronotropic effects, increases in coronary blood flow in isolated rabbit heart (Kholsa et al 2002). Plasma lipid levels (cholesterol, HDL-cholesterol, LDL-cholesterol, and triacylglycerol) were estimated in patients given an extract of Neem. Lipid levels including cholesterol and LDL-cholesterol were found to be lower during therapy when compared to the control group (non-malaria patients), while triacylglycerol and HDL-cholesterol levels were higher in the malaria patients than the control group (Njoku et al 2001). The effect of an *Azadirachta indica* hydroalcoholic leaf extract on the cardiovascular system was studied. The leaf extract was found to reduce a dose-dependent hypotensive effect without altering the amplitude or rate of respiration. In isolated frog heart, there was no noticeable change in the amplitude of contraction or heart rate at lower doses of leaf extract. At higher doses there was temporary cardiac arrest in diastole (Chattopadhyay 1997). An alcoholic extract of Neem leaf was investigated for its effects on ECG and blood pressure in rats. The intravenous administration of the extract resulted in initial bradycardia followed by cardiac arrhythmia, as well as a significant and dose-related fall in blood pressure (Koley and Lal 1994).

Immune: The hexane extract of Neem seeds caused a specific activation of T lymphocyte cells of CD8+ subtype as well as phagocytic cells followed by an elevation in the cytokines gamma-interferon and TNF, in rodents (Mukherjee et al 1999). Using the haemolytic plaque technique, an aqueous extract of *Azadirachta indica* stem bark was shown to enhance the immune response of BALB/C mice to sheep red blood cells *in vivo* (Njiro and Kofi-Tsekpo 1999). The immunomodulatory effects of Neem oil were studied in mice, treated intraperitoneally, with or without peanut oil. Treatment enhanced the number of leukocytic cells, and peritoneal macrophages exhibited enhanced phagocytic activity and expression of MHC class-II antigens. Neem oil treatment also induced the production of gamma interferon. The spleen cells of Neem oil-treated animals showed a significantly higher lymphocyte proliferative response to an *in vitro* challenge with Con A or tetanus toxoid (TT) compared to controls (Upadhyay et al 1992).

Antiinflammatory: A water soluble component of an alcoholic extract of Neem leaves at a dose of 200 mg/kg (p.o.) exerted significant antiinflammatory activity in a cotton pellet granuloma assay in rats. The extract also inhibited the biochemical parameters (viz. DNA, RNA, lipid peroxide, acid phosphatase and alkaline phosphatase) studied in cotton pellet exudates (Chattopadhyay et al 1998).

Antitumor: Researchers examined the inhibitory effects of Neem flowers on 9,10-dimethyl-1,2-benzanthracene (DMBA)-induced mammary gland carcinogenesis in female Sprague Dawley rats and on aflatoxin B(1)(AFB(1))-induced hepatocarcinogenesis in male Wistar rats. Neem flowers resulted in a marked reduction of the incidence of mammary gland (approx. 35.2%) and liver tumors (61.7% and 80.1% for benign and malignant tumors, respectively). Furthermore, the multiplicity of tumors per rats was also lower in the Neem flower groups, i.e. those for mammary gland tumors and benign and malignant liver tumors were reduced to 44.0%, 87.9% and 88.9%, respectively (Tepsuwan et al 2002). Neem oil was found to enhance the radiosensitivity of Balbc/3T3 cells by interacting with residual damage after x-irradiation, converting the sublethal damage or potentially lethal damage into lethal damage, inhibiting the double-strand break repair or reducing the G(2) phase of the cell cycle (Kumar et al 2002).

Anxiolytic: The potential anxiolytic activity of a leaf extract of *A. indica* was investigated and compared with that of diazepam in rats using elevated plus maze and open field behaviour test paradigms of anxiety. Doses equal to 10, 20, 50, 100, 200, 400 and 800 mg/kg of the freshly prepared leaf extract of *A. indica* were administered preorally 45 minutes before behavioural testing. Low doses of the extract produced significant anxiolytic effects comparable to diazepam, whereas higher doses did not (Jaiswal et al 1994).

Contraceptive: Researcher examined the effect of *Azadirachta indica* powder on fertility. Male albino rats received 100 mg each *A. indic*a leaf powder by gavage. On alternate days, a second group of rats received 0.125 mg testosterone dipropionate intramuscularly. A third group received both *A. indica* leaf powder by gavage and testosterone dipropionate intramuscularly. After autopsy, an ultrastructural analysis of the testis revealed that animals treated with A. indica there were alterations in both the Sertoli cells and Leydig cells, and defects in spermatids, suggesting antispermatogenic and antiandrogenic properties (Kasturi et al 2002). The hexane extract of Neem seeds was found to completely inhibit pregnancy in rodents up to a concentration of 10%. No apparent toxic effects could be seen following treatment (Mukherjee et al 1999). The effect of the oral administration of a crude aqueous extract of Neem on serum testosterone and other blood constituents was studied in the male Wistar rats for 10 weeks. Treatment with Neem resulted in significant decreases in total testosterone, total bilirubin and K+ in serum, with increases in packed cell volume, mean corpuscular haemoglobin concentration, red blood cell, white blood cell and lymphocyte counts, all without showing any cytotoxic effects in the body (Parshad et al 1994).

Oral hygiene: A clinical trial over a two month period showed that a Neem mouthwash was found to be active against Strepto*coccus mutans,* reversing incipient carious lesions (Vanka et al 2001). Chewing sticks made from *Azadirachta indica* was observed to be susceptible to post-harvest spoilage and are not advisable for oral hygiene measures if not fresh (Etebu et al 2003).

Scabies: A Neem and *Haridra* paste was used in the treatment of scabies in 814 people. A 97% cure rate was obtained within 3 to 15 days of treatment, with no toxic or adverse reactions (Charles and Charles 1992).

Mosquito repellent: Two percent Neem oil mixed in coconut oil applied to the exposed body parts of human volunteers, provided complete protection for 12 hours from mosquito bites (Sharma et al 1993).

Antiviral Researchers investigated the *in vitro* and *in vivo* inhibitory potential of a crude aqueous extract of Neem leaves and isolated azadirachtin on the replication of the Dengue virus type-2. The aqueous extract of Neem completely inhibited viral replication, whereas azadirachtin had no effect (Parida et al 2002). A methanolic extract fraction of the leaves of Neem was found to inhibit plaque formation in 6 antigenic types of Coxsackie virus B *in vitro* (Badam et al 1999).

Antifungal: *Azadirachta indica* (stem bark) demonstrated fungistatic and fungicidal activity against *Candida* spp., *in vitro* (Fabry et al 1996).

Antibacterial: A methanolic and acetone extract of *Azadirachta indica* demonstrated a significant antimicrobial activity against *Bacillus cereus* (Alzoreky and Nakahara 2003). A Neem extract was found to be effective at 50% concentration on *Streptococcus mutans* and *Streptococcus faecalis*, *in vitro* (Almas 1999).

Toxicity: A cumulative oral dose of the crude bark extract of Neem, of 1 to 9 g/kg in mice over a 15 day period, was well tolerated and below the LD_{50} (Bandyopadhyay et al 2002). The seed oil of Neem was determined to have a 24 hour oral LD_{50} of 14 ml/kg in rats and 24 ml/kg in rabbits. The lungs and central nervous system appeared to be the target organs of toxicity. In comparison, a mustard seed oil was determined to have an oral LD_{50} of 80 ml/kg (Gandhi et al 1988).

Indications: Dyspepsia, ulcers, intestinal parasites, hemorrhoids, liver diseases, fever, malarial fever, cough, bronchitis, asthma, tuberculosis, skin diseases, inflammatory joint disease, cystitis, amenorrhea, diabetes, tumors, conjunctivitis and ophthalmic disorders generally.

Contraindications: *Vatakopa.*

Medicinal uses: Neem is a widely used remedy in India, cultivated in villages, gardens and parks for its beauty as well as for its medicinal properties, as a culinary spice, as a chewing stick, and for firewood. The name Neem is an ancient name, derived from the Sanskrit phrase ***ñ****Nimbati svasthyamdadati,****ò*** meaning the Neem *(nimba)* is a gift (*dadati*) of good health (*svasthya).* Neem is a sacred tree in India, associated with *Lakshmi*, the goddess of abundance and good fortune, and *Surya*, the sun. Neem has a bitter taste and a cooling energy, acting to remove congestion and reduce inflammation, and is thus reserved for afflictions of *Pitta* and *Kapha.* Although one study indicates an anxiolytic effect, the *Bhavapraksha* states specifically that it is ñbad for the heart,ò and ñunpleasant for the mindò (Srikanthamurthy 2001, 242). Neem is an important herb in fever, used in simple formulations such as a soup prepared with *Patola (Trichosanthes dioica)* (Sharma 2002, 6). It is also used in more complex formulations such as *Nimbadi kvatha,* used in the treatment of *masurika,* or chicken pox, comprised of equal parts Neem, *Haritaki, Katuka, Vasaka, Ushira, Amalaki, Chandana, Parpata (Fumaria indica), Duralabha (Fagonia cretica), Patola (Trichosanthes dioica),* and *Raktachandana (Pterocarpus santalinus)* (Sharma 2002, 469). In the treatment of jaundice the *Chakradatta* recommends a buffalo milk decoction of Neem, *Haridra, Pippali, Bala* and *Madhuka (Glycyrrrhiza glabra)* (Sharma 2002, 120). In the treatment of acid reflux and vomiting associated with gastritis, as well as colic and fever, the *Chakradatta* recommends a decoction of Neem, *Guduchi, Triphala* and *Patola (Trichosanthes dioica),* taken cool with honey (Sharma 2002, 168, 265). In the treatment of *unmada* (psychosis) Neem leaves are reduced to a powder with *Vacha, Hingu, Sarshapa (Brassica*

campestris seed) and the discarded skin of a snake, and burned as an incense (Sharma 2002, 190). In the treatment of gout and eczema Neem is mixed with equal parts *Triphala, Manjishta, Vacha, Katuka, Guduchi* and *Daruharidra (Berberis aristata),* taken as a *churna* or *kvatha* (Sharma 2002, 236). In combination with *Punarnava, Katuka, Guduchi, Devadaru, Haritaki, Patola (Trichosanthes dioica),* and *Shunthi (Zingiber officinalis),* Neem is stated to be an effective treatment for intestinal parasites associated with anemia and dyspnea (Sharma 2002, 347). Mixed with *Haridra,* Neem has been shown to be an effective remedy in the treatment of scabies, and similar formulations can be used in *udvartana abhyanga* in the treatment of obesity and edema. Neem is also used in premature aging and grayness associated with anger and physical strain, used as a simple medicated *taila* in *nasya* therapy for a period of one month (Sharma 2002, 490). Neem flowers are traditionally used in Tamil cookery, stir-fried with pepper, mustard seed, and *Hingu* in *ghee,* after which water, tamarind paste, curry leaves and salt are added, as the base of a spicy, flavourable *dipanapachana* soup. Neem has recently undergone much investigation for its insecticidal properties against disease-carrying insects such as mosquitoes and common agricultural pests such as flies, beetles, worms, cockroaches and moths, but appears to cause little harm to beneficial insects such as wasps, butterflies, bees, spiders and earthworms (Vietmeyer 1992, 39-59). Organic farmers can thus take advantage of Neemôs insecticidal properties to good advantage, and people can apply the diluted oil (2%) to ward off mosquitos, without fear of harm. Some studies suggest that Neem may act as a contraceptive, but this application is still in the experimental stage.

Dosage:

Å*Churna:* bark, leaf, 1-2 g b.i.d.-t.i.d.
Å*Svarasa:* leaf, 6-12 mL b.i.d.-t.i.d.
Å*Hima:* leaf, 30-90 mL bi.d.-t.i.d.
Å*Kvatha:* bark, 30-60 mL
Å*Seed oil:* topically only, 2-50% v/v in a carrier oil

Bilaga 6.

The Neem Tree

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What is neem?

The neem tree (*Azadirachta indica*) is native to tropical South East Asia. It is fast growing, can survive drought and poor soil and keeps its leaves all year round. It is a tall tree, up to 30 metres high, with leafy spreading branches. Many white flowers which smell of honey appear for the first time when the tree is 2 to 3 years old, and the tree bears fruit after 3 to 5 years. The ripe fruit are about 2 centimetres (cm) long and oval shaped. Inside the fruit there is a light-coloured seed about 1.5 cm long.

How does neem grow?

Rainfall and altitude

Neem trees can be grown in areas which have between 400 millimetres (mm) and 1500mm of rain each year. It performs best at an altitude of less than 1,500 metres.

Temperature

Neem trees will survive very hot temperatures, up to 44°C and as low as 4°C. Some people report neem trees surviving light frost.

The seeds of neem do not live long and are usually planted as soon as possible after the fruit ripens and usually within three months. To help the seeds live longer the fruit pulp should be removed by hand and the seeds dried in the shade to a level of 15 to 20% moisture content. If the seeds have been properly air dried they should survive for up to twelve months in a refrigerator at 4°C.

How can neem be used?

Although it has many uses, the most important use for neem products is to fight against crop pests and diseases. Worldwide approximately one third of crops in the field and in storage are lost to pests each year. The worst affected are maize and rice in Africa and Asia. The main focus of this booklet is to describe how neem can be used to help combat and overcome these problems.

How do neem extracts control pests?

Neem extracts contain a natural chemical called azadirachtin. The substance is found in all parts of the tree. The leaves are used effectively, though the chemical is much more concentrated in the fruit, especially in the seeds.

Neem extracts do not usually kill insect pests immediately. They change the feeding or life cycle of the insect until it is no longer able to live or have young. This might mean that the neem extract takes a long time to work if the pest attack is severe. Other insects will avoid a plant treated with neem extracts.

When neem products are exposed to light they begin to lose their ability to control pests. For this reason the commercial neem based insecticide, Margosan-O, that is sold in the USA, contains a sunscreen. Neem based pesticides are suitable for use in developing countries because the useful chemicals can be easily removed from the neem without the use of expensive and complicated equipment.

The uses of neem

There are many different ways to use the extracts of the neem tree. Some of the most common methods are described in this section.

Neem leaves for grain storage

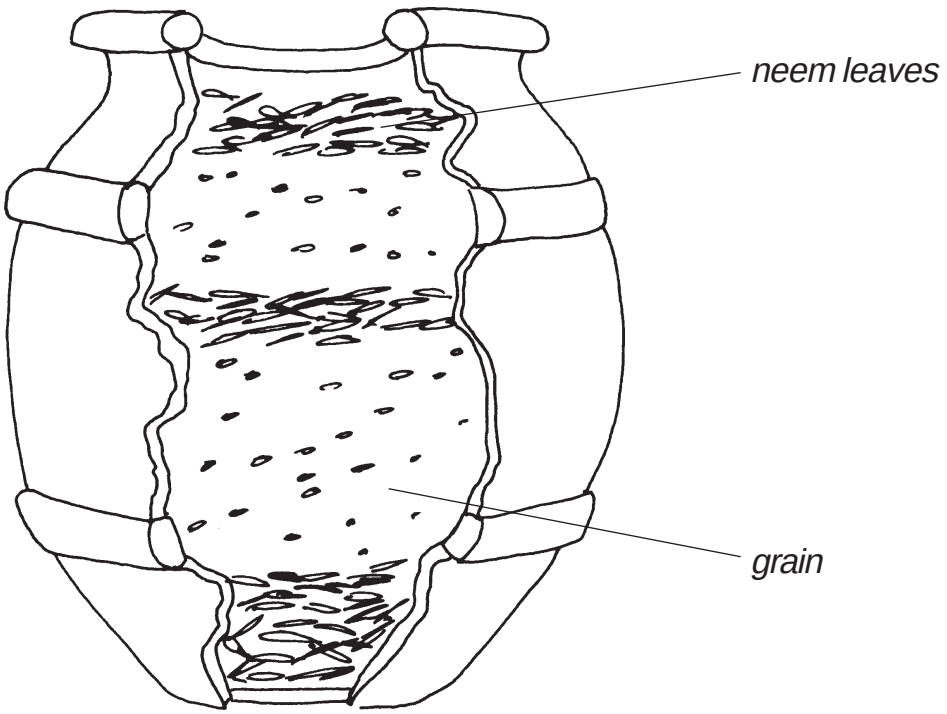
When neem is used in grain storage, pests can be kept away from the grain for a whole year; but if the grain is already infected with pests the protection will not work.

Method one

1. Place a 1.5 cm layer of fresh neem leaves, is placed in the bottom of a storage container.

2. Place a layer of sun dried grain (up to 30cm) is placed on top of this followed by another layer of neem leaves.

These layers can be repeated until the container is full, finishing with a good layer of leaves.



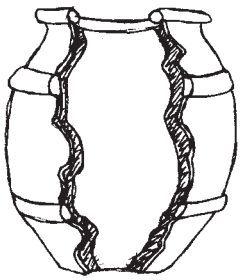
A grain container showing how neem leaves are applied between the layers of grain

Method two

1. Dry neem leaves in the sun so that the leaves stay green.

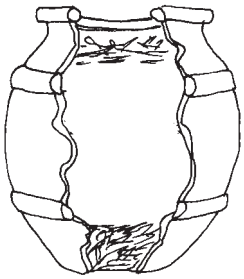
2. Grind them into a powder.

3. Mix the powder with clay and water.



4. Plaster the inside walls of the storage container with the mixture and allow to dry.

5. Place a layer of neem leaves, which have been dried in the shade, on the bottom of the container.



6. Fill the container with grain.

7. Place a layer of dried neem leaves on top and close the storage container.

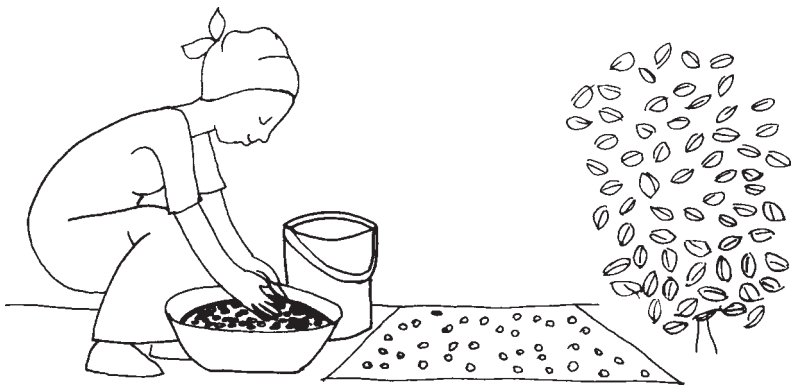
Method three

If grain is being stored in sacks, neem leaf powder can be mixed directly with the grain. Mix 1 or 2 kilograms (kg) of powder to 100 kg of grain.

Crushed neem

Preparing crushed neem seed

1. The ripe fruit pulp should be removed from the seed as soon as possible after harvest, otherwise the seeds may become covered in mould. In some areas birds or fruit bats eat the pulp if the seeds are left outside and uncovered.



2. The seeds should then be laid out in a thin layer in the sun to dry out for a few days.

3. The dried seeds should be stored in containers with plenty of air to stop mould growing, such as baskets or sacks.

4. The shells have to be removed using stones or a big mortar. The loose shells can then be removed by winnowing in the same way as with cereals.

5. The kernels are then ground in a mill or in a mortar.

Crushed neem seed to control stem borers on young plants

1. A small amount of crushed neem seed powder should be mixed with the same amount of dry clay or sawdust.

2. The mixture is sprinkled over young plants or placed in the funnel of young maize and sorghum plants.

3. Rain will gradually dissolve the active chemicals in the neem seed.

4. This treatment may need to be repeated every 8 to 10 days until the plants flower.

Neem powder is sprinkled in the funnel of young maize plants

Neem oil from neem seed

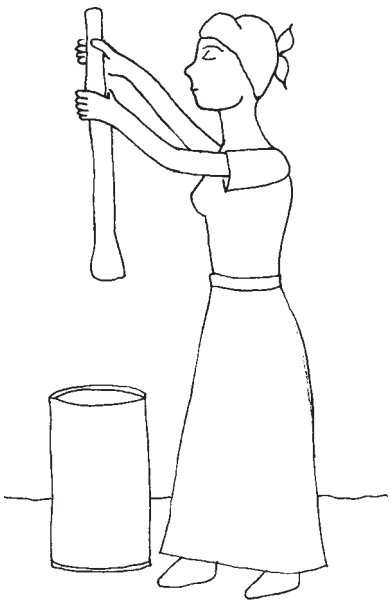
You should be able to extract 100 to 150 milligrams of oil for every 1 kilogram of neem seed.

Extracting neem oil

1. To press neem oil by hand, the kernels of the neem seed should be crushed in a mill or pound in a mortar.

2. Add a small amount of water until the mixture forms a firm paste that can be kneaded.

3. Knead the paste until oil drops form on the surface.



4. Press firmly to extract the oil.

5. The kneading and pressing should be continued in turn until the maximum amount of oil is removed. (The oil content of the seed kernel is about 45%).

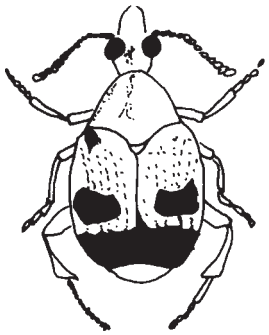
In some areas there are traditional ways of removing oil from other seeds such as sesame or groundnut. It is a good idea to try these methods with neem. Heating the oil will not affect the ability of neem to control insects.

Controlling Bruchid beetles in stored beans with neem oil

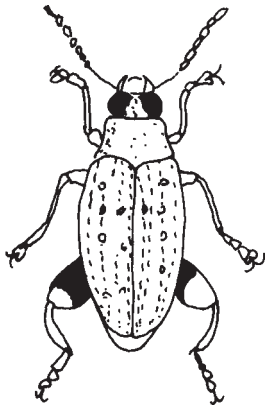
Neem oil is used to control Bruchid beetles which are small beetles whose larvae eat into stored beans and other legumes.

Mix 2 to 3ml of neem oil for every 1kg of beans or seeds before storing.

The oil has a bitter taste but it is not reported to change the taste of stored beans for humans to eat.



Cowpea Bruchid



Groundnut Bruchid

Control of soil-borne pests

The neem cake which is left after the oil is extracted from the seed, is also useful for controlling several pests which live in the soil, particularly nematodes.

Neem water

Preparing neem water

1. Grind 500 grams (g) of neem seed kernels in a mill or pound in a mortar.

2. Mix crushed neem seed with 10 litres of water. It is necessary to use a lot of water because the active ingredients do not dissolve easily. Stir the mixture well.

3. Leave to stand for at least 5 hours in a shady area.

4. Spray the neem water directly onto vegetables using a sprayer or straw brush.

5. Once applied the effect of the neem lasts for 3 to 6 days.

Neem water can be stored and will remain effective for 3 to 6 days if it is kept in the dark.

If crops have to be watered, water should go directly on the soil because water running over the leaves of sprayed plants may wash off the neem water extract.

It has been estimated that 20 to 30kg of neem seed (an average yield from 2 trees), prepared as neem water can treat one hectare of crop.

Neem water as a spray to control cutworms

Water based neem spray is most effective against pests such as cutworms. During the day the caterpillars stay on the ground and feed on plant roots. At night they eat young stems. Plants most affected include many vegetables and other affected plants include maize, tobacco and coffee.

Neem water should be sprayed at the point where the young plants emerge from the ground.

Neem water taken up by plants

Some plants will take up neem extract through their roots and into the leaves and other parts of the plant. The water based neem extract described above may be tried. Only some plant species take up the active ingredients; for example beans take up azadirachtin, but potatoes do not. Insects which feed on the parts of these plants where the azadirachtin is carried around in the plant, can be controlled in this way.

What pests can neem extract be used against?

Neem extracts are better at controlling some pests than others. Cold pressed neem oil and seed cake can both be used for pest control. The leaves can also be used to control pests, but there is less of the useful chemicals than in the seed.

Good control

Neem extract is usually most effective against beetle larvae, butterfly and moth caterpillars as their development into actual beetles is impaired. Examples of these are Mexican bean beetle larvae, Colorado potato beetle larvae and diamondback moth.

Neem is very effective against grasshoppers, leaf miners and leaf hoppers, for example variegated grasshoppers, green rice leafhopper and cotton jassid. When neem is taken up by the plant it will usually affect leaf hoppers and plant hoppers because they feed from the inner part of the plant which carries the azadirachtin around inside the plant. Grasshoppers will stop eating almost immediately after neem extract is applied but caterpillars may not stop eating for 2 or 3 days.

Controlling locusts with neem is very effective. neem spray makes them slow, flightless and solitary as opposed to a swarming mass.

Neem provides good control for various flies. The horn fly breeds in animal dung. If neem is fed to animals the flies are repelled by the smell and taste of neem in the dung. The same is true for fruit flies. Neem water sprayed under fruit trees, where fruit flies usually breed and larvae develop, stops the growth of the larvae into flies.

Some control

Neem is fairly good at controlling adult beetles, aphids, white flies and armyworms. These are less likely to settle and lay their eggs for some time after spraying. Beetles that feed on plant material as adults, such as the brown leaf beetle, may sometimes avoid plants treated with neem extracts. Beetles and weevils avoid grain or other crops which are stored in containers which have been treated with neem. Aphids avoid plants which are sprayed regularly.

When neem extracts are taken up by the plant it will not control aphids in the same way as it does hoppers because aphids feed on the outer layer of the plant which contains very little of the neem extract.

Poor control

Neem gives only poor control of mealybugs and scale insects, adult bugs, fruit maggots and spider mites.

Why use neem for pest control?

Pests are often controlled with man made chemicals which have many harmful effects.

- Artificial chemicals kill useful insects which eat crop pests.
- Artificial chemicals can be very bad for the health of people who use them and people who eat food with small amounts of chemicals in the skin, the leaves or on the surface.
- Artificial chemicals can stay in the environment and in the bodies of animals causing problems for many years.
- Artificial products are very simple chemicals and insect pests can very quickly, over a few breeding cycles, become resistant to them and can no longer be controlled.
- Artificial chemicals are often expensive and unaffordable.

  Neem, however, has properties which are very effective against many pests and diseases, and it is not harmful to the environment.

- Neem contains several active chemicals which work in different ways. As a result of this, pests are unlikely to become resistant to neem. The most well known natural chemical in neem is azadirachtin.
- Neem is easy to prepare and use, and is environmentally safe and not harmful to man and animals.
- Neem does not usually affect beneficial insects, for example those that eat crop pests. This is because neem extracts must be eaten to take effect. Insects that feed on plant tissue are likely to be affected but those that feed on nectar or other insects are unlikely to eat enough neem extract to be affected. Beneficial insects include bees, parasitic wasps, spiders and ladybirds.

Other uses of neem

Almost any part of the neem tree is useful and some of the additional benefits it provides are described below:

- Extracts from the neem tree are also used as mosquito repellents, fertilisers, diabetic food and animal feed.
- Neem leaves and the neem cake which is left over when oil has been removed from seeds can improve soil structure and add to the plant nutrient base.
- Neem leaves can be used to make soil less acid.
- The wood of the neem tree is strong and resistant to termite damage. It is also good for firewood and for making charcoal.
- The neem tree is good for shade and is often planted on roadsides.
- Neem extracts are used to treat many health problems. People bathe in neem water to relieve heat rashes and boils. Neem oil is used against stomach ulcers and rheumatism. Neem bark contains a strong antiseptic and neem is used to make soap and toothpaste. Neem twigs are used to clean teeth.

Reference list

‘**Neem: A Tree for Solving Global Problems**,’ (1992) National Research Council, National Academy of Sciences, 2101 Constitution Avenue NW, Washington, DC 20418, USA

‘**Neem a Natural Insecticide**,’ 34pp. Brochure available from GTZ, Dag - Hammarskjold - Weg 1 - 5, 65760 Eschborn, Germany

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Universum Verlagsanstatt GmbH KG
65175 Wiesbaden
Tel: 0611 - 9030252 Fax: 0611 - 9030556
Email: horst-dieter.herda@universum.de

‘**Developing Countries Farm Radio Network**,’ 1990. Package 16, Item 7. Neem trees provide safe no-cost control of many insects. From DCFRN, 40 Dundas Street West, Box 12, Suite 22B, Toronto, Ontario, Canada, M5G 2C2

‘**Rural Production and Use of Plant Preparations for Crop and Postharvest Production**’ available from GTZ, Postfach 5180, 6236 Eschborn 1, Bundesrepublik, Germany

Notes

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Further information on neem and on organic farming can be obtained from HDRA. Other publications include booklets covering composting, green manures, weed control and the neem tree, as well as single information sheets about crop pests and diseases and their control, natural pesticides and green manures. Please write to:

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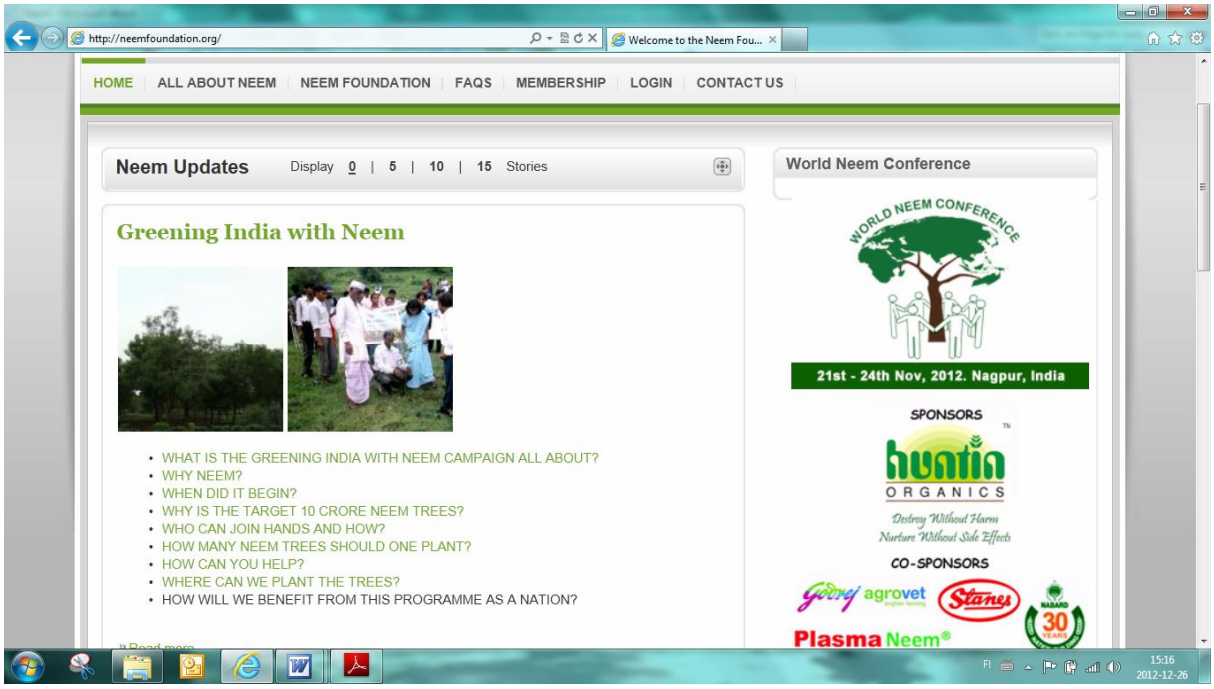
COVENTRY CV8 3LG
United Kingdom
Tel: +44 (0) 24 7630 3517 Fax: +44 (0) 24 7663 9229
Email: ove-enquiry@hdra.org.uk
Website: www.hdra.org.uk

The aims of HDRA - the organic organisation are to carry out scientific research into, collate and disseminate information about, and promote interest in organic gardening, farming and food in the UK and overseas. For more than a decade, HDRA's international programme has been involved in the support and extension of sustainable farming practices; supporting research on aspects of tropical organic agriculture, providing advice and literature on appropriate organic techniques and providing tree seeds and technical information to organisations involved in tree planting and research.

We gratefully acknowledge the generous support of the Charlton Community Development Trust in the production of this booklet.

HDRA
the organic organisation

Bilaga 7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WHO CAN JOIN HANDS AND HOW?
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Bilaga 8

Neem: The Village Pharmacy

Recently, I was seeking an organic pesticide for my home plants so that it is not harmful when used indoors. Guess what? A product made of Neem was highly recommended by the local nurseries.

I was amazed how the products made out of the Neem tree were fast becoming a household name in USA. I still remember the most prolific use of Neem as a natural antiseptic toothbrush. Till today, millions of rural folds prefer breaking off a small twig from the Neem tree, chewing it until it becomes a soft brush and then rubbing it around the gums and the teeth. Then, they would split the twig into two and use the flat hard surface as a tongue cleaner. No plastic toothbrushes or artificially made tooth pastes are necessary. This is one of the most eco-friendly organic uses of a natural tree. I also remember the branches of Neem trees being tied together and hung from windows and doors to ward off mosquitoes and evil powers. Almost every village you visit would have a giant Neem tree in the village square which provided shade and natural air-conditioning to the gatherings under its huge spread. It has now been scientifically proven that the temperatures under the Neem tree are 10 degrees lower than its surrounding areas! The Neem tree has so many valuable uses for the health and environment that is considered a Village Pharmacy on its own in India. Lately, the Bio-Tech industry has jumped on the Neem órevolutionô bandwagon, and countless patents and legal suits have followed. The medicinal properties of Neem have been known to Indians since the ancient days. The Ayurvedic system of medicine have found benefits in the fruits, seeds, oil, leaves, roots and bark of the Neem. It has been referred to as óSARVAROGHARIô. Sri Navin Patnaik has aptly said it in his book, óPossessed of many and great virtues, this native Indian tree has been identified on the five thousand years old seals excavated from the Indus valley. Today the Neem is valued more highly for its capacity to exorcise the demon of disease than the spirit of the dead, and an image of the folk goddess Sitala can often be suspended from a branch where she guards against small pox, once the great killer of the Indian countryside. Renowned for its antiseptic and disinfection properties, the tree is thought to be particularly protective of women and children. Dried leaves are burnt as mosquito repellent. Fresh leaves, notorious for its bitterness, are cooked and eaten to gain immunity from malaria.ô

A large number of medicines, cosmetics and toiletries are now made from the Neem tree products. Every piece of the Neem tree is useful.

The Bark of the Neem tree is cool, bitter, astringent, acrid and refrigerant. It is useful in tiredness, cough, and fever, loss of appetite, worm infestation, vomiting and skin diseases.

The Neem leaves help in the treatment of neuro muscular pains. Neem leaves also remove toxins, purify blood, insect bites and eye disorders.

The fruits of the Neem tree are bitter, purgative, anti-hemorrhodial and anthelmintic. The flowers are used to cure pitta and kapha. They are astringent, anthelmintic and non-toxic.

The seeds are additionally anti-poisonous. The Neem oil has several medicinal qualities. All the five parts of the Neem tree as used in treating blood diseases. It is also used in extreme conditions of excess heat, itching, wounds, burning sensations in the body and skin diseases.

Some of the common home-remedies or treatments using Neem are:

1. Mix pure dried Neem oil with Vaseline to create a cream which can be used as an insect repellent and to treat minor cuts, burns etc.

2. Make tea using Neem leaves and add rose water to make bath water to protect your skin.

3. You can make Neem water by boiling 10 freshly cut and cleaned Neem leaves and a liter of water to be used as eyewash after the water cools down.

4. Mix Neem oil with coconut oil to be used to cure dandruff and head lice.

5. Mix Neem water and honey to treat sore throats.

6. Mix Neem powder with pure water to make a paste to apply to your face to cure acne and pimples.

7. Use pure Neem oil as nasal drops to cure sinusitis.

8. Chew a few Neem leaves regularly to purify your blood, and to cure hyperacidity and diabetes.

9. Essential oil from fresh leaves cures mild fungicide infections.

There is tremendous amount of research being down for the use of Neem in treating Aids, Arthritis, Birth Control, Cancer, Dental Care, Diabetes, Heart Disease, Malaria, Rheumatism, Stress, Ulcers, Vitiligo, Skin Diseases and Viral diseases such as small pox, chicken pox, herpes and Hepatitis B.

The Neem tree is also extremely environment friendly. Neem has powerful pest controlling properties. Pesticides made from Neem are much safer than the non-organic pesticides which cause several detrimental side-effects.

No wonder, Neem in our culture has been ranked higher than Kalpavriksha, the mythological wish-fulfilling tree!

Sources: several web-sites, Neem Foundation, several BBC and India Today press articles.

Neem-toxins-purify blood-insect bites-eye disorder-ayurveda-medicine-tiredness-cough-and fever-loss of appetite-worm infestation-vomiting-skin diseases

Bilaga 9

Tips on Using Neem

The Neem tree exemplifies Mahatma Gandhiôs concept of economy of permanence and has much to offer in solving global, agricultural, environmental and public health problems. No other tree can match Neemôs usefulness. Neem rightfully belongs to the millions of ordinary Indians who learnt to put it to use, as it is this knowledge, passed down through generations, that has helped scientists discover Neemôs amazing potential. The commercial and industrial prospects of neem are unlimited and exciting. There is no other tree that touches the life and living of such a majority of the countryôs population.

1. Mix pure neem oil with Vaseline in the ratio of 1:5. This combination can be used for repelling insects including mosquitoes as well as for skin disorders, minor cuts, burns, wounds etc.
2. For complete skin protection make a strong tea with neem leaves and add to the bath along with a little rose water.
3. Boil 10 freshly cleaned neem leaves along with cotton with a liter of water for approx. 10 mins. Cool. Use as an eyewash in case of conjunctivitis, itching etc.
4. For athletesô foot and other foot problems, make a strong tea and soak feet.
5. For dandruff and head lice: Massage neem oil mixed with coconut or olive oil into hair and leave for 1 hour. Shampoo. Repeat once weekly for 3 weeks or as long as problem persists.
6. To treat a sore throat without antibiotics, gargle with neem leaf water (add 2 ï 3 neem leaves to 300 ml water and cool) to which honey has been added.
7. For acne, pimples, skin infections pure neem leaf powder mixed with water to the affected area.
8. In case of sinusitis, use pure neem oil as nasal drops. Two drops morning and evening.
9. Prevent breeding of mosquitoes by adding crushed neem seeds and neem oil to all breeding areas. Neem products ensure complete inhibition of egg laying for seven days.
10. Add 30 ml of neem oil to 1 ltr of water. Mix well. Add 1 ml of teepol (liquid detergent) and spray immediately for plant protection. Do not store the mixture; make fresh formulation for each spray.
11. Boil 40 ï 50 neem leaves in 250 ml of water 20 mins. Cool, strain and refrigerate to use as a astringent.
12. Chewing 2 ï 3 neem leaves regularly helps purify the blood and in cases of hyperacidity and diabetes.
13. To ward of mosquitoes, add 5 ï 10% neem oil to any oil and light as a diya (lamp).
14. Add shake dried neem leaves for preservation of food grains like rice, wheat, lentils etc. The leaves should be replaced every 2 ï 3 months.

Store neem oil in a cool dark place, away from sunlight. In case neem oil solidifies due to low temperatures, put the bottle in warm water (below 95 degree F) to liquefy. Putting the bottle in very hot water may reduce the effectiveness of oil.

Neem Tree Components

Since ancient times, neem has been associated with healing in the sub-continent of India. A large

number of medicinals, cosmetics, toiletries and pharmaceuticals are now based on neem derivatives because of it's unique properties.

Bark : Neem bark is cool, bitter, astringent, acrid and refrigerant. It is useful in tiredness, cough, fever, loss of appetite, worm infestation. It heals the wounds and is also used in vomiting, skin diseases and excessive thirst.

Leaves: According to Ayurveda, Neem leaves help in the treatment of vatik disorders (neuro muscular pains). Neem leaves are also reported to remove toxins, purify blood and prevent damage caused by free radical in the body by neutralising them. Neem leaves are reported to be beneficial in eye disorders and insect bite poisons. It treats Vatik Disorders (neuroand muscular pains)

Fruits: Neem fruits are bitter, purgative, antihemorrhodial and anthelmintic in nature.

Flowers: Neem flowers are used in vitiated conditions of pitta (balancing of the body heat) and kapha (cough formation). They are astringent, anthelmintic and non-toxic.

Seeds: Neem seeds are also described as anthelminitic, antileprotic, antipoisonous and bitter in taste.

Oil: Neem oil derived from crushing the seeds is antidermatonic, a powerful anthelmintic and is bitter in taste. It has a wide spectrum of action and is highly medicinal in nature.

Mixture: Five parts of Neem tree ie. Bark, Root, Fruit, Flower and Leaves together are used in diseases of blood. It is also used in vitiated conditions of excess heat, itching, wound, burning sensation in body and skin diseases.

Following is a informal compilation of sime of the investigations done in Neem in recent past.

THE LEAF

Neem leaves are now known to contain nimbin, nimbinene desacetylnimbinase, nimbandial, nimbolide and quercentin.

Neem leaves have shown potential in the following areas :

Studies indicate that tender leaves are effective in Parasitic infections.

A 10% aqueous extract of tender leaves has been found to posess anti-viral properties.

Studies on plasma clotting time using Russel's viper venom have proved that the leaf extract contains a clotting inhibitor. This justifies its use in the treatment of poisonous bites.

A total extract of Neem leaves has shown potential as a potent Hepatoprotective agent

Water extract of Neem leaves have shown significant antiulcer activity

Essential oil from fresh leaves has a mild fungicidal action

Neem leaf extract shows significant Anti-inflammatory effect

Neem leaf extract have shown reduction in the frequency and severity of stress-induced gastric mucosal lesions.

Intraperitoneal administration of Neem leaf, bark and seed extracts revealed immuno-stimulatory properties of Neem, which are responsible for their anti-HIV effect.

THE FRUIT & SEEDS

Azadirachtins from Neem seed kernel, are among more than a 100 compounds found in Neem. So far twelve azadirachtins have been identified, all the twelve have high level of biological activity.

It has been reported that a single low dose of azadirachtin immunized the kissing bug a transmitter of Chagas disease.

Azadirachtins have shown inhibition of larval, pupal and adult moults and of reproduction and fitness of both plant-feeding and aquatic larvae like mosquitoes.

Gedunin, contained in whole fruit has been shown to possess antimalarial activity.

THE BARK

Nimibidin found in neem bark is now known to be antipyretic and non-irritant, and it has found to be effective in treatment of skin diseases such as eczema, furunculosis, arsenical dermatitis, burn ulcers, Herpes labialis, scabies and seborrhaeic dermatitis.

It is also effective in the treatment of skin diseases of unknown origin, such as warts and dandruff.

Extracts of bark have potent diuretic and anti-inflammatory properties.

Nimbidin and sodium nimbidinate contained in neem bark are reported to possess spermicidal activity.
Neem bark has shown anti-bacterial activity against various gram positive organisms