Neem Research Newsletter

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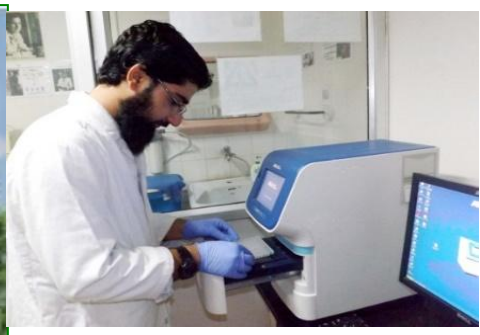

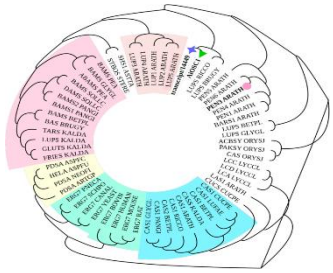

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WORLD NEEM ORGANISATION (WNO)

From

The Editor's Desk……

This is the First Issue for the year 2025 and it is heartening to note the sustained interest in researching neem's potential in diverse areas. Investigation of the efficacy of various botanicals against lepidopteran insect pests in rice demonstrated that treatment with neem extract was highly effective and can be incorporated into integrated pest management of rice. Likewise, neem-based insecticides were also found to be highly efficacious against cotton pests. Azadirachtin from neem has been listed among the most useful bioacaricides for crop protection. Further, azadirachtin was also found to be less toxic to beneficial insects. A bibliographic review that aims to provide researchers, policymakers, and practitioners with a valuable resource for understanding the current landscape of biopesticides in corn pest management has highlighted the use of neem extracts for minimal environmental impact, specificity, and potential to reduce pest resistance. Combination of neem oil, Trichoderma harzianum, Purpuricillium lilacinum and Lemongrass oi was found to provide effective nematode control without phytotoxic effects, enhancing plant growth and offering a promising sustainable alternative to chemical nematicides. One of the major findings that can have a significant environmental impact is the synthesis of epoxidized neem oil that can transform neem oil into a value-added product, reduce petroleum dependence, and provide key insights into reaction kinetics for industrial applications. As part of evaluation of the health benefits of traditional medicinal plants including neem, used in Kenya, the primary bio-chemical characterization, antioxidant and antimicrobial features were explored using standard procedures. In a review on complementary medicines to combat COVID-19, the effect of neem in increasing increase immune cell synthesis has been documented. Gedunin, a neem limonoid has been suggested as a potential therapeutic agent for acne treatment based on its key inflammatory activity. Gedunin has also been identified as a potential therapeutic agent for reversing Alzheimer's disease. Aqueous extract of neem was shown to exercise a prophylactic effect against kidney damage induced by the antibiotic gentamycin. A pioneering molecular docking study from Egypt has unveiled the effectiveness of neem extracts as therapeutic solution to combat multidrug resistant bacterial infections. Silver nanoparticles synthesised from neem was demonstrated to exert cytotoxic effects against lung cancer cells. A combination of curcumin-nimbin loaded nanosuspension demonstrated promising anticancer activity against colorectal cancer cells.

S. Nagini

Core Founding Member, WNO
Chief Scientific Coordinator &
Regional Director, South India

Neem in Agriculture

Pesticidal plant extract effect against major lepidopteran insect pests and their natural enemies in rice *Oryza sativa* L.

Seni A, Pal R, Mohapatra S, Mandal D, Bansude SK, Seth P, Barla S, Sahu J.Front Insect Sci. 2025 Jan 7;4:1500542. doi: 10.3389/finsc.2024.1500542. eCollection 2024.PMID: 39839193

Extracts of plants have been used to manage various insect pests, but little information is available about how effective they are in reducing crop damage or how they affect crop yield and beneficial insects in rice. Extracts from *Azadirachta indica* leaves, *Lantana camara* leaves, *Nerium oleander* leaves, *Aegle marmelos* leaves, *Allium sativum* cloves, and *Citrus limon* fruits, known to have insecticidal properties, were compared with two checks, viz., Azadirachtin 1% EC and standard insecticide Acephate 95 SG, for their efficacy against yellow stem borer (YSB), *Scirpophaga incertulas* (Walk.), and rice leaf folder *Cnaphalocrocis medinalis* (Guenee) and natural enemies in cultivated rice in Sambalpur, Odisha, India. Untreated rice plants served as control. An adjuvant, Tween 20 at 1%, was added with all the botanical extracts except the commercial formulation. Plant damage, insect population numbers, and yield were monitored during two consecutive wet seasons from 2022 to 2023. Mean rice yield was significantly higher in the *A. indica* and Acephate 95 SG treatments, i.e., 4.68 t/ha and 4.66 t/ha, respectively, compared to the control (2.27 t/ha) and were significantly at par with each other. The *L. camara* and *A. indica* treatments were effective against both the major lepidopteran rice insect pests. The highest cost-benefit ratio of (1:4.65) was obtained from the Acephate treatment and was closely followed by the *A. indica* treatment (1:3.74). All the studied botanicals had less impact on natural enemies than synthetic chemicals. Among these botanicals, the maximum mean population of predators (like spiders and carabid beetles) and parasitoids (like *Tetrastichus schoenobii*, *Telenomus dignus*, and *Trichogramma japonicum*) were observed in the *A. indica* and *A. marmelos* treatments. Although all the studied botanicals were effective against both the major insect pests in rice, the *A. indica*, *A. marmelos*, *A. sativum*, and *L. camara* treatments showed the most promising against rice insect pests, so they may be incorporated into integrated pest management of rice.

Lethal and sublethal effects of selected bacterial and **neem**-based novel insecticides on cotton aphid, Aphis gossypii and the predator, Coccinella septempunctata.

Shannag HK, Al-Salman AA.Bull Entomol Res. 2025 Jan 31:1-14. doi: 10.1017/S0007485324000671. Online ahead of print.PMID: 39885827

We evaluated the lethal and sublethal effects of two novel Betaproteobacteria-based insecticides (*Burkholderia* spp. strain A396 as Venerate® XC; *Chromobacterium subtsugae* strain PRAA4-1 as Grandevo® WDG) and two neem-based insecticides (1.2% azadirachtin A and B as Azatrol and 3% azadiractin as Molt-X) on the cotton aphid, *Aphis gossypii*, and its natural enemy, *Coccinella septempunctata*. Aphids were given both residual and direct treatments, i.e. exposed to residues applied by leaf dipping, or by spraying the insects and foliage, while the predator was treated directly with insecticides.

Well-established spirotetramat (Movento® 240 SC) was used as standard due to its effectiveness against a wide range of pests, its unique mode of action, and its systemic properties. All insecticides were effective against aphid mostly in concentration-dependent manner, as do exposure time, but at different magnitudes. Spirotetramat and Azatrol induced the highest toxicity to adult aphids, while spirotetramat and Molt-X were more noxious to aphid nymphs. *C. subtsugae* and *Burkholderia* were less effective, inducing only moderate levels of aphid mortality. Azatrol and spirotetramat were more detrimental to the fecundity of aphid compared to other products. Insecticides significantly increased the development time of nymphs surviving exposure to insecticides, except *Burkholderia.* Azatrol were more destructive to eggs, larvae and adult of *Coccinella septempunctata*, together with spirotetramat for young larvae and adults, relative to other treatment. The development time of predator larvae remained unaffected by treatment. New Betaproteobacteria- and neem-based insecticides except Azatrol seem to be a promising tool to suppress population of *Aphis gossypii* and integrate pest management programmes.

Bioacaricides in Crop Protection-What Is the State of Play?

Marčić D, Döker I, Tsolakis H.Insects. 2025 Jan 17;16(1):95. doi: 10.3390/insects16010095.PMID: 39859676

Growing demands for environmentally safe and sustainable pest management have increased interest in biopesticides as alternatives to synthetic chemical pesticides. This review presents the current status of bioacaricides, defined as commercial biopesticide products based on microorganisms (microbial acaricides) and biologically active substances of microbial, plant or animal origin (biochemicals and semiochemicals) used in crop protection against spider mites (Tetranychidae) and other plant-feeding mites. The most important microbial bioacaricides are mycopesticides, which are products manufactured from living propagules of *Beauveria bassiana* s.l. and several other acaropathogenic fungi. Products based on avermectins and milbemycins, secondary metabolites of actinomycetes, are well-known examples of biochemicals of microbial origin. Among the biochemicals of plant origin, the most widely used to date have been the products based on pyrethrum-obtained from the Dalmatian daisy, *Tanacetum cinerariifolium* (Asteraceae)-and azadirachtin, obtained from the Indian neem tree, *Azadirachta indica* (Meliaceae). In recent years, products based on essential oils from aromatic plants belonging to the families Lamiaceae, Myrtaceae, Rutaceae and others have also gained increasing importance in the market. Special emphasis in this review is given to the compatibility of bioacaricides with predatory mites of the family Phytoseiidae as biological control agents used in the integrated management of plant-feeding mites.

Assessing the lethal effects of pesticide residue exposure on beneficial parasitoids and their host, Halyomorpha halys (Stål) (Hemiptera: Pentatomidae).

Luo ZY, Gao LP, Li WJ, Chen JH, Ali MY, Zhang F, Li FQ, Wang XP, Zhang JP.J Econ Entomol. 2025 Jan 8:toae281. doi: 10.1093/jee/toae281. Online ahead of print. PMID: 39774915

Chemical control is currently the main strategy for managing brown marmorated stink bug, Halyomorpha halys (Stål). However, chemical pesticides can harm nontarget species, including natural enemies of H. halys. Pesticides with high toxicity to H. halys and low toxicity to its parasitoids need to be identified to support H. halys management. This is not only for natural biological control but also for preemptive classical biological control of H. halys by parasitoids. Here, we assessed the contact toxicity of residues of eight insecticides against H. halys and three of its main parasitoid species (Anastatus japonicus Ashmead (Hymenoptera: Eupelmidae), Trissolcus japonicus Ashmead (Hymenoptera: Scelionidae), Trissolcus cultratus Mayr (Hymenoptera: Scelionidae)). This study aims to provide valuable insights for preemptive classical biological control of H. halys using these parasitoids. Our results showed that A. japonicus exhibited higher tolerance to the tested pesticides, while T. japonicus was the most sensitive species. Among the pesticides, chlorantraniliprole had the lowest overall impact on all three parasitoid species. Additionally, acetamiprid, azadirachtin, and rotenone were found to be harmless to A. japonicus. Acetamiprid, however, was slightly harmful to T. cultratus. The remaining pesticides showed moderate to significant harmful effects on the parasitoids. For H. halys adults and fifth instars, the pesticides tested caused no mortality within the 24 h exposure. However, young nymphs were susceptible to the tested pesticides. Fenpropathrin had the highest toxicity to H. halys, killing 83.3%, 52.8%, and 19.4% of second, third, and fourth instars in a 24 h exposure. Fenpropathrin, acetamiprid, cyfluthrin, azadirachtin, and dinotefuran were all slightly harmful to the first instar nymphs. The other pesticides were harmless to H. halys in a 24 h exposure. Halyomorpha halys mortality increased with the contact time with the residue. Mortality of fourth and fifth instars of H. halys was >70% for fenpropathrin, cyfluthrin, dinotefuran, abamectin-aminomethyl, and acetamiprid if exposure continued for 7 d. Acetamiprid was effective in controlling H. halys nymphs but exhibited varying levels of toxicity towards the three tested parasitoid species, depending on the residue age and exposure time. Azadirachtin showed lower overall toxicity to beneficial insects, suggesting that these materials could be used to manage H. halys while minimizing harm to key beneficial species.

A bibliometric analysis of biopesticides in corn pest management: Current trends and future prospects.

Krismawati A, Yustisia Y, Arifin Z, Purbiati T, Rachmawati D, Latifah E, Putra NR, Irianto I, Qomariyah L.Heliyon. 2024 Nov 6;10(22):e40196. doi: 10.1016/j.heliyon.2024.e40196. eCollection 2024 Nov 30. PMID: 39748967

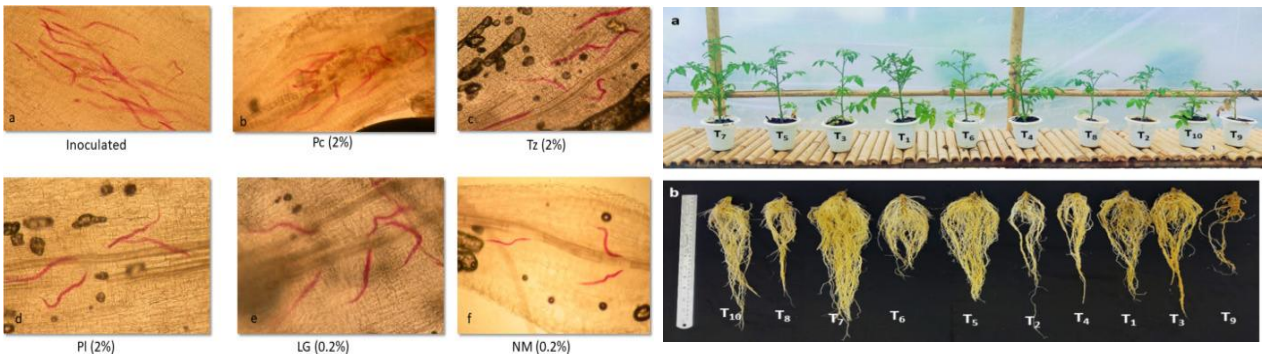
This bibliographic review paper presents a comprehensive analysis of the scholarly literature on biopesticides utilized in corn pest management, employing a bibliometric approach to identify current trends and prospects in the field. The growing demand for sustainable agricultural practices has fueled interest in biopesticides as effective alternatives to conventional chemical pesticides. By systematically examining relevant publications, this review synthesizes the collective knowledge on biopesticide applications in corn production, encompassing various types of biopesticides, their modes of action, efficacy against key corn pests, and environmental considerations. The study synthesizes recent advances in microbial, botanical, and biochemical biopesticides such as Bacillus

thuringiensis, neem extracts, and linalool, highlighting their specificity, minimal environmental impact, and potential to reduce pest resistance. It delves into the modes of action, including insecticidal activity, feeding disruption, and pest reproduction inhibition. The review also outlines an integrated pest management (IPM) strategy that combines biopesticides with agronomic practices, including crop rotation, biological control agents, and resistant crop varieties. This combined approach aims to enhance pest suppression, improve yield sustainability, and reduce chemical pesticide reliance. The findings provide valuable insights into sustainable corn pest management practices, promoting environmental conservation and agricultural productivity. Ultimately, this review aims to provide researchers, policymakers, and practitioners with a valuable resource for understanding the current landscape of biopesticides in corn pest management and guiding future research directions toward sustainable crop protection strategies.

Implementing sustainable practices to combat root knot nematode infestation in tomato farming from Meghalaya.

Jeevan H, Patidar RK, Kadam V, Dutta P, Nongbri E, Gouda MNR, Naik S, Nysanth NS.Sci Rep. 2025 Jan 2;15(1):602. doi: 10.1038/s41598-024-84292-5.PMID: 39753659

Root-knot nematodes (Meloidogyne spp.) are significant pests that cause considerable damage to crops, prompting a need for sustainable control methods. This study evaluated



the nematicidal potential of fungal culture filtrates and botanicals as eco-friendly alternatives. In vitro tests demonstrated that Lemongrass oil (LG) (0.2%) achieved the highest mortality of nematode juveniles (J_2s) at 99.44% within 48 h, while Pochonia chlamydosporia (Pc) (2%) and Purpuricillium lilacinum (Pl) (2%) reduced egg hatching rates to 9.57% and 11.43%, respectively. Neem oil (NM) (0.2%) was the most effective in preventing J_2 root penetration (4.42%). In vivo, a combination treatment (T_7) of NM (0.2%), Trichoderma harzianum (Tz) (2%), Pl (2%), and LG (0.2%) applied at 10 day intervals significantly reduced the nematode reproduction factor to 0.035, comparable to the chemical control Bayer Velum Prime® (Fluopyram 34.48% W/W SC) (0.031). T_5 (NM and Tz) resulted in the highest shoot biomass (236.73 ± 1.38 g), while Bayer Velum Prime® (Fluopyram 34.48% W/W SC) increased root biomass (31.75 ± 1.24 g). Additionally, T_7 produced the longest shoots (63.37 ± 0.74 cm) and roots (36.80 ± 0.3 cm), with fewer root galls (55.67 ± 1.53) and egg masses (4 ± 0.01). T_7 also minimized the final soil nematode population to 106.33 ± 1.01 per 100 g, closely followed by T_8 (94.67 ± 0.89). These results indicate that combining NM, Tz, Pl and LG provide effective nematode control without phytotoxic effects, enhancing plant growth and offering a promising sustainable alternative to chemical nematicides.

Neem for Sustainable Environment & Green Synthesis

Hybrid in-situ and ex-situ hydrolysis of catalytic epoxidation neem oil via a peracid mechanism.

Rasib IM, Jalil MJ, Mubarak NM, Azmi IS.Sci Rep. 2025 Jan 2;15(1):147. doi: 10.1038/s41598-024-84541-7.PMID: 39748040

The depletion of oil reserves and their price and availability volatility raise researchers' concerns about renewable resources for epoxidized material. This study aims to produce in situ and ex-situ hydrolyzed dihydroxy stearic acid via the epoxidation of neem oil. Epoxidized neem oil was synthesized using in situ-generated performic acid. The Taguchi method was employed to optimize hydrolysis, aiming for maximum production of dihydroxystearic acid. The Taguchi method's signal-to-noise (S/N) ratio analysis identified optimal conditions for producing dihydroxy stearic acid with a maximum hydroxyl value of 129.4 mg KOH/g: (1) water/neem oil molar ratio of 2:1, (2) water addition time of 90 min, and (3) reaction stop time of 120 min. ANOVA revealed the significant order of parameters as reaction stop time > water addition time > water/neem oil molar ratio. Lastly, a mathematical model was developed using MATLAB, applying the fourth-order Runge-Kutta method and simulated annealing optimization to determine the best-fitting kinetic model. This research aids in transforming neem oil into a value-added product, reduces petroleum dependence, and provides key insights into reaction kinetics for industrial applications.

Neem for Human Health

Exploring the antioxidant and antimicrobial properties of five indigenous Kenyan plants used in traditional medicine.

Gichuru V, Sbrocca I, Molinari M, Tonto TC, Locato V, Cimini S, De Gara L.Sci Rep. 2025 Jan 9;15(1):1459. doi: 10.1038/s41598-024-80883-4.PMID: 39789046

Defined by the World Health Organization (WHO) as indigenous knowledge and practices used for maintaining health and treating illnesses, traditional medicine (TM) represents a rich reservoir of ancient healing practices rooted in cultural traditions and accumulated wisdom over centuries. Five indigenous Kenyan plant species traditionally used in African TM, named Afzelia quanzensis, Azadirachta indica, Gigasiphon macrosiphon, Grewia bicolor, and Lannea schweinfurthii, represent a valuable resource in healing practices, yet their chemical composition and bioactivity remain understudied. To depict a primary bio-chemical characterization of these plants, their antioxidant and antimicrobial features have been evaluated by the use of methods validated in this context. G. bicolor, and G. macrosiphon were found to have great potential as sources of bioactive metabolites, such as chlorophyll a (1456.29 µg/ g DW; 1104.33 µg/ g DW), chlorophyll b (712.48 µg/ g DW;

443.31 µg/ g DW), and carotenoids (369.71 µg/ g DW; 300 µg/ g DW) as well as phenols (31.78 mg GAE/g DW; 27.54 GAE/g DW), and exhibiting high antioxidant activity, according to TEAC, DPPH and FRAP assays. Additionally, L. schweinfurthii and G. macrosiphon demonstrated antimicrobial activity against the Gram-negative bacteria E. coli, as well as against Gram-positive ones, S. aureus and B. subtilis.

Uncovering the Role of Indian Medicinal Botanicals in COVID-19 Prevention and Management: A Review.

Rao DMS, Mishra J, Vasudeo Damodar S, Gajendra Bagal J, S VK, Ammu Joseph R, Karra T, Shrivastava R.Cureus. 2024 Dec 18;16(12):e75920. doi: 10.7759/cureus.75920. eCollection 2024 Dec.PMID: 39830533

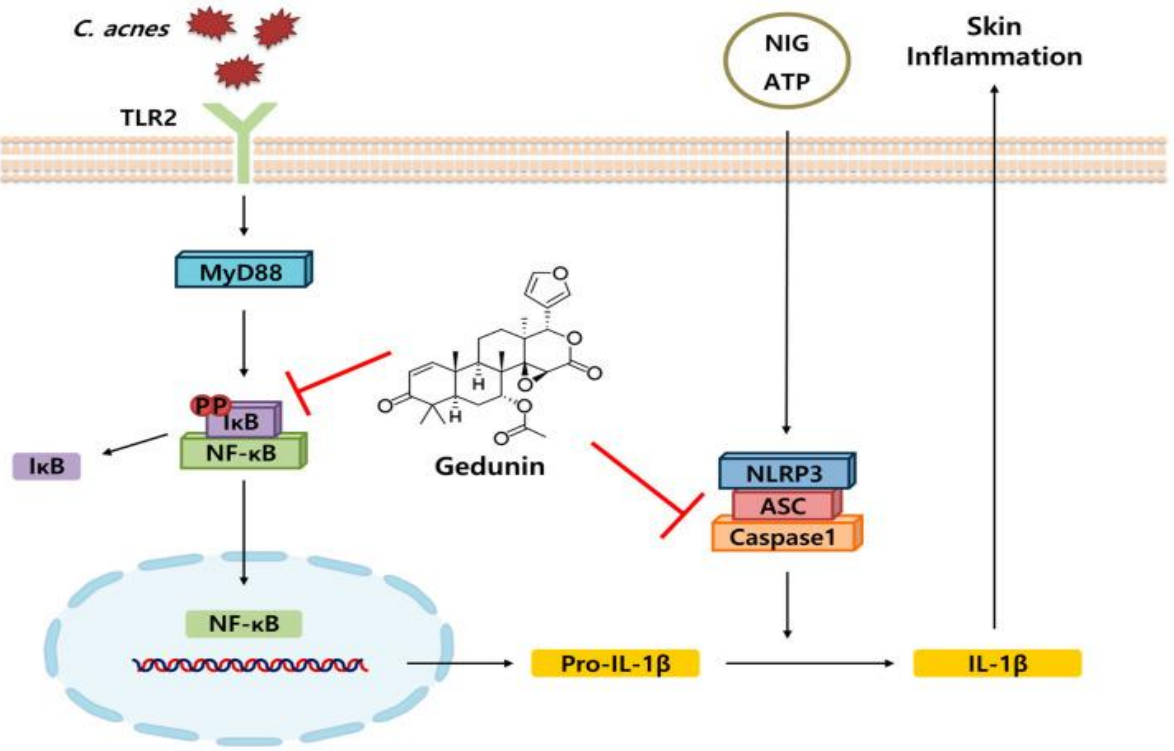
Indian traditional medicine, based on Ayurveda and Siddha, has become one of the global searches for complementary approaches to conventional interventions during the COVID-19 pandemic. This review presents the antiviral, immune-boosting, and anti-inflammatory properties of some medicinal key plants such as Tulsi (*Ocimum sanctum*), Neem (*Azadirachta indica*), Ashwagandha (*Withania somnifera*), Amla (*Emblica officinalis*), and Giloy (*Tinospora cordifolia*). Tulsi appears to inhibit viral replication, Neem increases immune cell synthesis, while Ashwagandha regulates inflammation and stress responses. Vitamin C-rich Amla increases immune defense while also providing protection against oxidative stress and Giloy modulates immune response and its activity, acting as an overall resilience against infection. However, the clinical integration of these plants into mainstream healthcare is hindered by the absence of robust clinical trials, standardization of phytochemicals, and the absence of global standard protocols. In order to establish safety and efficacy, substantial research is needed, including large-scale randomized clinical trials and sophisticated bioinformatics techniques. Indian medicinal plants provide innovative, sustainable, and holistic solutions to global health crises, such as the COVID-19 pandemic, by bridging traditional knowledge with modern scientific frameworks.

Gedunin Mitigates *Cutibacterium acnes*-Induced Skin Inflammation by Inhibiting the NF-κB Pathway.

Sim JK, Heo YJ, Shin JH, Kim SS, Seo SR.Pharmaceuticals (Basel). 2025 Jan 9;18(1):71. doi: 10.3390/ph18010071.PMID: 39861132

Background/Objectives: *Cutibacterium acnes (C. acnes)*, a bacterium residing in hair follicles, triggers acne by inducing monocyte-mediated inflammatory cytokine production. Gedunin, a limonoid derived from *Azadirachta indica* (commonly known as neem), is renowned for its antifungal, antimalarial, anticancer, anti-inflammatory, and neuroprotective effects. However, its role in mitigating *C. acnes*-induced skin inflammation remains unexplored. This study investigates the anti-inflammatory effects of gedunin on *C. acnes*-induced skin inflammation and elucidates the underlying mechanisms. **Methods**: The anti-inflammatory activity of gedunin was assessed using RAW 264.7 mouse macrophage cells and mouse bone-marrow-derived macrophages (BMDMs). Key inflammatory mediators, including interleukin-1β (IL-1β), tumor necrosis factor-α (TNF-α), inducible nitric oxide synthase (iNOS), cyclooxygenase-2 (COX-2), and interleukin-6 (IL-6), were evaluated. Mechanistic studies focused on the nuclear factor-kappa B (NF-κB) and

mitogen-activated protein kinase (MAPK) signaling pathways, along with the NOD-like receptor pyrin domain-containing 3 (NLRP3) inflammasome. An in vivo acne model was employed to examine gedunin's therapeutic efficacy. **Results**: Gedunin significantly reduced the expression of IL-1β, TNF-α, iNOS, COX-2, and IL-6 in RAW 264.7 cells. It inhibited NF-κB activation without affecting the MAPK pathways, including JNK/SAPK, ERK, and p38 MAPK. Gedunin also suppressed the activation of the NLRP3 inflammasome in BMDMs. In the mouse acne model, gedunin effectively alleviated *C. acnes*-induced inflammation, primarily by targeting NF-κB signaling. **Conclusions**: Gedunin demonstrates potential as a therapeutic agent for acne treatment by targeting key inflammatory pathways, particularly NF-κB signaling. This study highlights gedunin's promise as an alternative approach to managing *C. acnes*-induced skin inflammation.



Aqueous Leaf Extract of **Azadirachta indica** Protects Against Gentamicin-Induced Kidney Injury via Decreases in Renal Function, Inflammation, and Apoptosis Markers.

Ogundipe OJ, Ojetola AA, Akinpelu OF, Sossou IT, Ishola AB.J Med Food. 2025 Jan 13. doi: 10.1089/jmf.2023.0294. Online ahead of print.PMID: 39804626

The effect of the aqueous extract of *Azadirachta indica* (AAI) on gentamicin (GEN)-induced kidney injury was investigated. The study involves 20 adult male Wistar rats (housed in four separate plastic cages) such that graded dosages of AAI were administered to the experimental group for 14 days per oral (PO) before exposure to GEN toxicity (100 mg/kg) for 1 week. At the end of the study, comparisons of some markers of renal functions, antioxidant status, and inflammatory and apoptotic markers were made between the control, GEN, and AAI-pretreated groups at $P < .05$. The result showed that GEN treatment caused a significant increase ($P < .05$) in body weight, kidney weight, urea, bilirubin, kidney injury molecule 1 (KIM 1), cystatin C, malondialdehyde (MDA), reduced

glutathione (GSH), tumor necrotic factor alpha (TNF-*α*), interleukin-1 (IL-2), caspase-3, and B-cell lymphoma-2 associated X (BAX) as well as a significant decrease ($P < .05$) in superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (Gpx), and B-cell lymphoma (BCL)-2 level. Pre-treatment with graded doses of AAI caused a significant increase in urea, CAT, and GPx as well as a significant decrease ($P < .05$) in kidney weight, bilirubin, KIM 1, cystatin C, MDA, GSH, SOD, TNF-*α*, IL-2, caspase-3, BAX, and BCL-2. There was an appreciable difference in the kidney histology of the AAI pre-treated groups compared with the GEN. Hence, the extract has prophylactic potential in managing GEN-induced nephrotoxicity by decreasing the markers of renal function and inflammation and downregulating the markers of apoptosis.

Pioneering study of Egyptian **Neem** and Jojoba extracts with molecular docking combat hospital multidrug resistant bacteria.

Khairy T, Amin DH, Salama HM, Elkholy IMA, Elnakib M, Gebreel HM, Sayed HAE.Braz J Microbiol. 2025 Jan 8. doi: 10.1007/s42770-024-01590-w. Online ahead of print.PMID: 39775688

Hospital surfaces are often contaminated with multidrug-resistant pathogenic bacteria that cause healthcare-associated infections and lead to increased mortality and morbidity. There is a need for new alternative antibacterial agents to overcome antibiotic resistance. Azadirachta indica and Simmondsia chinensis have been found to possess antibacterial activity and medicinal value. The antibacterial activity of these plant extracts against clinical isolates was investigated using the agar disc diffusion method. These clinical isolates included E. coli, Pseudomonas aeruginosa, Acinetobacter spp., Klebsiella pneumoniae, Stenotrophomonas maltophilia, and methicillin-resistant Staphylococcus aureus (MRSA), which were identified by the vitek-2 system, and resistance genes of selected bacterial strains were identified by using the bioFire FilmArray test. The most potent extract of these plants was the ethanolic extract, where the inhibition percentage of ethanolic Jojoba and Neem extracts was 90.9% and 74.5%, respectively against all the tested pathogens. On the other hand, the methanolic extracts of Neem and Jojoba have different degrees of antibacterial activity against the tested pathogens. The phytochemical components of the most potent extracts (ethanolic extracts) were investigated by gas chromatography–mass spectrometry (GC\MS), which revealed that the ethanolic extracts were enriched in phenolics, flavonoids, and sugars. FTIR analyses of the plant extracts confirmed the presence of alcoholic, carboxylic, and aldehydic moieties. The 2,2-diphenyl-1-picrylhydrazyl (DPPH) activity of the ethanolic extracts of Neem and Jojoba increased in a dose-dependent manner, with average IC50 values of 98.17 ± 0.85, 4.95 ± 0.06, and 4.17 ± 0.04 mg/mL, respectively, for the ethanolic Neem extract, the ethanolic Jojoba extract, and ascorbic acid (standard). Furthermore, increased cytotoxicity was demonstrated in the HFB4 cell line in a dose-dependent manner. The average IC50s of the ethanolic Neem extract and the ethanolic Jojoba extract were 18.18 ± 0.15 and 76.16 ± 1.49 mg/mL, respectively. Moreover, the results for the antibiofilm activity of the ethanolic Neem extract showed that 99.5% of the biofilms formed at 25 mg/ml. In addition, 50 mg/ml of the ethanolic extract of Jojoba had a suppressive effect of 98.2%. The significant components Nonanoic acid (21.9405%) and Palmitic Acid (16.0869%) from Neem and

pinitol from Jojoba (82.85%) were selected throughout the molecular docking investigation, by which the chosen constituents inhibited the crystal structure of penicillin-binding protein 4 (PBP4) from Staphylococcus aureus (PDB ID: 1TVF) and the crystal structure of the OXA-48 beta-lactamase (PDB ID: 7AUX) from K. pneumoniae. Overall, our study reveals the effectiveness of antimicrobial plant extracts as therapeutic solutions for antibiotic resistance in Egypt and worldwide with some modifications to decrease their cytotoxicity.

"Comparative evaluation of cytotoxicity of three herbal endodontic irrigants at three intervals of time" - An *in vitro* study.
Suraksha H, Shetty S, Jayalakshmi KB, Sujatha I, Harishma S, Choudhary S.J Conserv Dent Endod. 2024 Nov;27(11):1126-1130. doi: 10.4103/JCDE.JCDE_525_24. Epub 2024 Nov 11.PMID: 39777391

Aim: The aim of the study was to evaluate and compare the cytotoxicity of 25% of neem leaf extract (*Azadirachta indica*), 20% of guava leaf extracts (*Psidium guajava*), and 20% of cinnamon extract (*Cinnamomum zeylanicum*) irrigants at three intervals of time. **Methodology:** Four groups were formed (*n* = 15), Group 1 (control group) - normal saline solution, Group 2 - 25% of neem extract, Group 3 - 20% of guava extract, and Group 4 - 20% of cinnamon extract. Each group was further divided into three subgroups based on intervals (*n* = 5). Subgroup A - at 10 min, Subgroup B - at 20 min, and Subgroup C - at 30 min. One hundred microliters of each irrigant was added to 2 mL of the diluted red blood cells suspension obtained from a human volunteer. Hemoglobin (Hb) estimation was done with an automated hematology analyzer after incubating the test samples at 10, 20, and 30 min intervals. **Results:** The reduction in the mean Hb values was not statistically significant in the normal saline, guava, and cinnamon groups. However, in the neem extract group, the mean Hb values reduced significantly at $P < 0.001$. Among the subgroups, Subgroup A (10 min) showed the least cytotoxicity. **Conclusion:** In the present study, 20% guava extract had the lowest cytotoxicity and cytotoxicity increased with time. Hence, 20% guava extract can be used as an alternative to conventional irrigants as it has been shown to have the least cytotoxicity.

Untangling the complex mechanisms associated with Alzheimer's disease in elderly patients using high-throughput RNA sequencing data and next-generation knowledge discovery methods: Focus on potential gene signatures and drugs for dementia.
Alkhatabi HA, Pushparaj PN.Heliyon. 2024 Dec 18;11(1):e41266. doi: 10.1016/j.heliyon.2024.e41266. eCollection 2025 Jan 15.PMID: 39834440

Objectives: Alzheimer's disease (AD) is a complex neurodegenerative disorder that primarily affects elderly individuals. This study aimed to elucidate the intricate mechanisms underlying AD in elderly patients compared with healthy aged individuals using high-throughput RNA sequencing (RNA-seq) data and next-generation knowledge discovery methods (NGKD), with a focus on identifying potential therapeutic agents.
Methods: High-throughput RNA-seq data were obtained from the Gene Expression Omnibus (GEO) database (accession number: GSE104704). These data were derived from healthy and diseased human brains (eight young healthy brains [young], 10 aged

healthy brains [Old], and 12 aged diseased brains [AD]). We used NGKD tools such as GEO RNA-seq Experiments Interactive Navigator (GREIN) to obtain differentially expressed genes (DEGs) by comparing the AD versus Old RNA-seq data and further filtered and normalized to obtain differentially regulated Kyoto Encyclopedia of Genes and Genomes (KEGG), Reactome and Panther pathways using ExpressAnalyst tool. Besides, WebGestalt was used to identify differentially regulated Gene Ontologies (GO) and the pre-ranked Gene Set Enrichment Analysis (GSEA) was performed using GSEA software. The X2K web tool was used to infer upstream regulator networks and X2K Appyter tool for obtaining transcription factors (TFs) and kinase network information. LFW1000 and L1000CDS^2 tools were used to identify specific drugs that reverse AD-associated gene signatures in elderly patients. **Results:** Our study revealed significant downregulation of pathways related to neuroactive receptor-ligand interaction, synaptic vesicle cycle, and neuronal system in elderly individuals with AD. GO analysis showed negative enrichment of functions related to cognition, potassium ion transport, receptor-ligand activity, SNARE binding, and primary lysosomes. The transcription factors SUZ12 and REST, along with increased MAPK signaling, were identified as key regulators of downregulated genes. Several drugs and natural products, including dihydroergocristine, mepacrine, gedunin, amlodipine, and disulfiram have been identified as potential therapeutic agents for reversing AD-associated gene signatures. **Conclusions:** This comprehensive analysis of AD in elderly individuals using RNA-seq data and NGKD tools revealed multiple differentially regulated pathways, gene signatures, and potential drugs for dementia treatment. These findings highlight the complex molecular mechanisms underlying AD and provide insights into potential therapeutic strategies. Further research is needed to validate these findings and to develop personalized treatment approaches for AD in elderly patients.

Eco-biofabrication of silver nanoparticles from **Azadirachta indica**, Gymnema sylvestre, and Moringa oleifera for lung cancer treatment.

Muthu T, Adusumalli R, Vemuri SK, Indira Devi M, Pavan Kumar P, Banala RR, Gurava Reddy AV.J Egypt Natl Canc Inst. 2025 Jan 6;37(1):1. doi: 10.1186/s43046-024-00252-0.PMID: 39757333

Introduction: Silver nanoparticles (AgNPs) derived from natural sources have garnered significant attention due to their unique properties and eco-friendly production methods. With lung cancer remaining a major global health issue, there is a continuous need for novel and effective therapeutic approaches beyond conventional treatments such as chemotherapy, immunotherapy, and targeted therapies. **Objective:** This study aims to synthesize AgNPs using plant extracts from Gymnema sylvestre, Moringa oleifera, and Azadirachta indica and to evaluate their anticancer activity, particularly their effects on gene expression in A549 lung cancer cells. **Methods:** AgNPs were synthesized using green chemistry techniques and characterized by X-ray diffraction (XRD) and Fourier-transform infrared spectroscopy (FTIR). Gene expression studies were performed to assess the impact of AgNPs on cancer-related genes such as VEGF and CYCLIN-D1. Cytotoxicity assays were conducted on A549 cells to determine the anticancer potential of the synthesized AgNPs compared to plant extracts alone. **Results:** XRD confirmed the

formation of crystalline AgNPs, while FTIR indicated the presence of bioactive compounds interacting with the nanoparticles. Gene expression analysis revealed significant downregulation of VEGF and CYCLIN-D1, suggesting inhibitory effects on angiogenesis and cell cycle progression. The synthesized AgNPs exhibited potent cytotoxic activity against A549 cells, with enhanced efficacy compared to the leaf extracts alone. **Conclusion:** The study highlights the potential of AgNPs synthesized from medicinal plant extracts as promising candidates for lung cancer therapy. Their environmentally sustainable production, combined with their ability to target key cancer pathways, positions them as innovative and affordable therapeutic agents in the field of nanomedicine.

In silico evaluation, characterization, and in vitro anticancer activity of curcumin-**nimbin** loaded nanoformulation in HCT-116 cell lines.

Madeswaran A, Tamilazhagan S, Mohan S.BioTechnologia (Pozn). 2024 Dec 19;105(4):355-365. doi: 10.5114/bta.2024.145256. eCollection 2024.PMID: 39844869

Colorectal cancer is one of the most prevalent malignancies worldwide and a leading cause of mortality. Chemotherapy medications are often limited in use due to issues like drug resistance, P-glycoprotein efflux, and relapse of chemotherapy. In this study, we formulated a nanosuspension with curcumin and nimbin to address these limitations and assessed its anticancer potential using *in silico* molecular docking and *in vitro* MTT assay. **Methods:** *In silico* docking and ADMET analyses targeted proteins implicated in colorectal cancer, with doxorubicin as the standard. The docking studies were conducted using AutoDock 4.2, while *in vitro* anticancer activity was assessed through the MTT assay in HCT 116 cell lines. **Results:** *In silico* docking of curcumin and nimbin showed significant interactions with target proteins compared to the standard. ADMET analysis indicated favorable Caco-2 permeability and intestinal absorption of the selected phytoconstituents. The MTT assay demonstrated concentration-dependent cell viability inhibition in HCT 116 cell lines treated with the nanosuspension, with an IC_{50} value of 30%. **Conclusion:** The curcumin-nimbin loaded nanosuspension demonstrated promising anticancer activity against HCT 116 cell lines in both *in silico* and *in vitro* studies. Further studies are required to evaluate the anticancer effect of curcumin-nimbin loaded nanosupension through clinical and preclinical studies for the progress of potential formulation in the treatment of colorectal cancer.