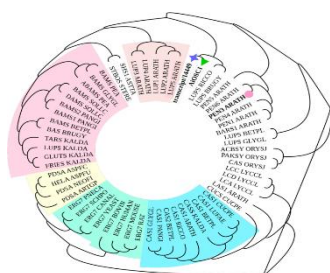


Neem Research Newsletter

Volume 6, Issue 8, 2026



WORLD NEEM ORGANISATION (WNO)



From

The Editor's Desk.....

This Issue of Neem Newsletter highlights several interesting findings that showcase the potential of neem in diverse areas. In West Africa, BioCC+, a polyherbal aqueous formulation containing *Azadirachta indica*, was developed to control maize contamination during storage. Evaluation of the insecticidal efficacy of azadirachtin against the tomato borer *Phthorimaea absoluta* indicated that the true efficacy profiles can be more accurately assessed by combining both short- and long-term bioassays. The antibacterial and antiviral properties of Vietnamese *A. indica* were demonstrated against *Vibrio* species and white-spot syndrome virus in shrimp. Exposure of the brine shrimp *Artemia franciscana* to neem extract induced strong, dose-dependent effects with high mortality and abnormal phenotypes in larvae, while adults displayed significant mortality with males more susceptible than females. Combined transcriptomic, histopathological, and phenotypic outcomes indicate that neem exposure causes marked changes in survival, development, and reproductive-associated endpoints in non-target aquatic invertebrates.

Evaluation of textile wastewater treatment was assessed using biological treatment with polyvinyl alcohol gel and a green chemistry strategy with neem leaf extract combined with polyaluminum chloride solution. The *A. indica* green chemistry treatment proved more efficient than biological treatment alone, offering a cost-effective, eco-friendly, and scalable solution.

The flavonoid rich fraction of neem was found to substantially control immune responses in malaria infection through antioxidant, anti-inflammatory activities in mice. A phyto-based Microemulsion composed of potato peel powder, Himalayan Curcumin powder, neem oil, and Aloe Vera gel, served as a biocompatible and sustainable formulation capable of improving wound recovery. Hydrophobic films fabricated from polyvinyl alcohol and neem seed oil exhibited antibacterial activity, mechanical stability, and superior hemostatic performance, making them promising candidates for wound dressing and prevention of blood loss. Neem leaf extract used by the Irula tribal community of southern India inhibited Russel's viper venom-induced haemorrhage providing a foundation for developing adjunct or alternative snakebite therapies.

A review on the medical importance of neem emphasized the methods of bioactive extraction and biochemical features of neem leaf extracts, and the various bioactive substances that contribute to antibacterial, anti-inflammatory, antioxidant, and immunomodulatory properties. Another review highlighted the protective effects of neem extracts, fractions, and bioactive compounds against leishmaniasis. Green synthesized silver nanoparticles of neem showed anthelmintic efficacy against tropical liver fluke. Integrated phytochemical and in silico analyses provided insight into the antifungal potential of ethanolic neem leaf extract. The mechanism underlying the potential of azadiradione against neurodegenerative disorders was reported. Epoxyazadiradione was shown to exhibit cytotoxic effects against pancreatic cancer. The chemoprotective effect of nimbolide against liver cancer and sepsis-associated acute kidney injury in mice was demonstrated.

Partial replacement of Rhodes grass hay with neem tree foliage (up to 66% of forage dry matter) reduced ruminal methane production and improved fermentation characteristics under in vitro conditions. Moreover, it improved feed dry matter intake and nutrient digestibility without adversely affecting cow health, highlighting the potential of neem tree foliage as a promising forage resource for dry cows feeding in arid regions.

S. Nagini
Core Founding Member &
Chief Scientific Advisor



Neem in Agriculture

[Evaluating the antifungal efficacy and bioactive metabolites of a traditional polyherbal aqueous formulation BioCC+ against *Fusarium graminearum* and *Fusarium verticillioides*.](#)

Kporou EK, Irakoze Z, Voloshchuk N, Lambert JD, Kellogg JJ, Wee J. Access Microbiol. 2026 Aug 11;8(8):001173.v3. doi: 10.1099/acmi.0.001173.v3. eCollection 2026. PMID: 42592052

Fungal contamination of cereal crops threatens global food security by compromising grain quality and introducing harmful mycotoxins that endanger human and animal health. In West Africa, the long-standing ancestral use of native plant extracts to manage fungal contamination provides sustainable and locally adaptable solutions. Building on this knowledge, BioCC+, a polyherbal aqueous formulation containing *Azadirachta indica*, *Cymbopogon citratus*, *Allium sativum* and *Capsicum frutescens*, was developed to control maize contamination during storage in Côte d'Ivoire. This study evaluated the antifungal activity of BioCC+ against *Fusarium graminearum* and *Fusarium verticillioides* followed by bioactivity-guided untargeted metabolomics to explain observed effects. Crude BioCC+ extracts inhibited *F. graminearum* at 12.5 mg ml⁻¹ and *F. verticillioides* at 25.0 mg ml⁻¹, with the dichloromethane extract (DCMe) showing greater antifungal activity than methanol or water extracts. Based on the observed growth inhibition, DCMe was selected for fractionation using silica gel column chromatography with the following mixtures of hexane:ethyl acetate as the mobile phase: 100 : 0 for F1, 75 : 25 for F2, 50 : 50 for F3, 25 : 75 for F4 and 0 : 100 for F5, as well as 100% methanol for F6. Fractionation of DCMe resulted in three active fractions (F3, F4 and F6), with F4 showing the strongest inhibition (MIC=0.4 mg ml⁻¹) against *F. graminearum*. Integration of antifungal activity assays with chemometric data through multivariate, univariate and correlation-based analysis identified six putative antifungal candidates, two known and four uncharacterized metabolites. These results provide a first step for integrating bioactivity assays with metabolomics to validate ancestral knowledge and develop community-driven practices for mitigating fungal contamination in staple crops.

[Validation of a novel bioassay method for the evaluation of the activity of slow-acting insecticides on tomato borer *Phthorimaea absoluta*.](#)

Stavarakaki M, Mylona K, Piperidis D, Afantenos G, Kremi K, Alipranti K, Simoglou KB, Roditakis E. Pest Manag Sci. 2026 Aug 18. doi: 10.1002/ps.71220. PMID: 42613772

Background: *Phthorimaea absoluta* is one of the most devastating pests of tomato crops worldwide, with its control relying heavily on chemical insecticides. Assessing the risk of control failure and resistance levels is critical for evaluating insecticide efficacy. The globally adopted bioassay protocol is Insecticide Resistance Action Committee (IRAC) method 022 (IRAC 022), which estimates mortality after a 3-day exposure. However, this short-term method may underestimate the effectiveness of slow-acting insecticides. Recently, the insecticides azadirachtin and spirotetramat were evaluated using both the IRAC 022 method and a modified version of this protocol that allows for prolonged

exposure intervals up to pest pupation (12 days after treatment (DAT)) and adult emergence (27 DAT). A susceptible and a wild resistant population from Greece were used in the method evaluation.

Results: For azadirachtin, a more than 100-fold difference in the median lethal concentration (LC_{50}) was observed between 3 DAT and 12 DAT, with minimal changes thereafter up to adult emergence. In contrast, spirotetramat showed at least a ten-fold difference between 3 DAT and 12 DAT, and up to a 17-fold difference between 12 DAT and 27 DAT, demonstrating delayed and stage-specific activity. These results indicate that the toxic action of insecticides may vary significantly depending on their pharmacological properties and the pest's developmental stage.

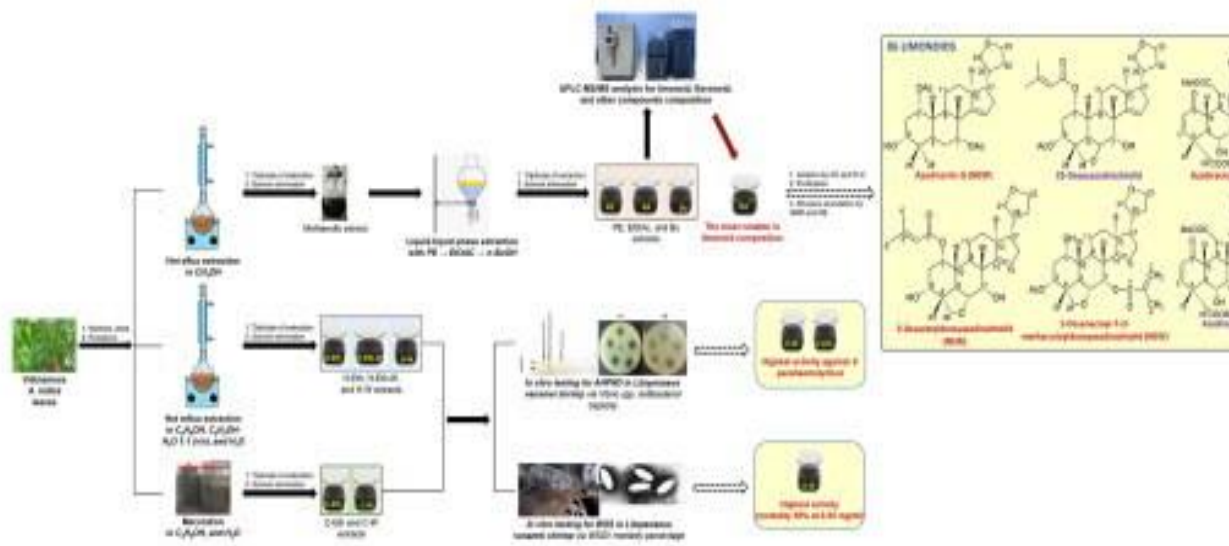
Conclusion: Incorporating long-term exposure protocols into the validated IRAC methods is strongly recommended for slow-acting compounds. By combining both short- and long-term bioassays, the true efficacy profiles of existing and novel insecticides can be more accurately assessed - an essential factor in developing evidence-based pest management strategies for *P. absoluta*.

Neem in Aquaculture

[New limonoids and the protective capacity of Vietnamese *Azadirachta indica* against *Vibrio* bacteria and white-spot syndrome virus.](#)

Tran LQ, Dang HP, Nguyen Vu DK, Tran Pham VL, Bui Thi TT, Ngo Huynh PT, Nguyen TYN. Nat Prod Res. 2026 Aug 5:1-11. doi: 10.1080/14786419.2026.2707351. PMID: 42555865

The antibacterial and antiviral properties of Vietnamese *Azadirachta indica* were assessed against *Vibrio* species and white-spot syndrome virus (WSSV) in *Litopenaeus vannamei* shrimp. *Vibrio parahaemolyticus* was susceptible to most extracts, with the cold ethanolic extract showing the greatest efficacy (IZD = 15.53 ± 0.67 mm). Antibacterial activity against *Vibrio alginolyticus* was observed only with the hot aqueous extract, which also demonstrated the highest anti-WSSV activity, causing 50% mortality at 0.25 mg/mL. Ultra-performance -liquid chromatography tandem mass spectrometry analysis revealed

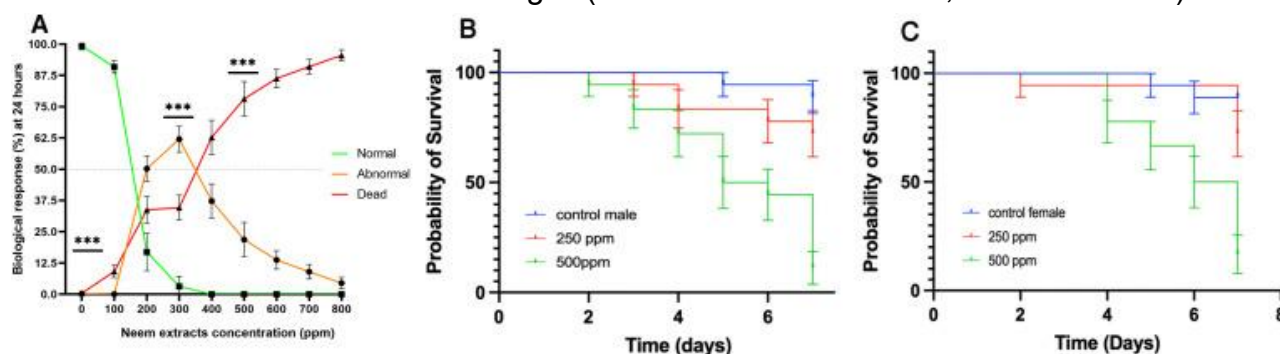


significant compositional diversity and distinctive limonoid and -flavonoid profiles. Column chromatography of the ethyl acetate extract resulted in the isolation of four novel limonoids [azadirachtin G (**1**), 3-desacetyldeoxyazadirachtolid (**2**), 1-desenecioyl-7-O-methacryloyldeoxy-azadirachtolid (**3**) and azadirachtolid C (**4**)] and two previously reported compounds [23-deoxy-azadirachtolid (**5**) and azadirachtolid A (**6**)]. Structural elucidation was achieved using nuclear magnetic resonance spectroscopy and mass spectrometry.

Effects of neem extract on *Artemia franciscana*: Insights from high-throughput transcriptomics and phenotypic analysis.

Farlora R, Bustos P, Tine EM, Jeria E, Eapen A, Pillai P, Pino J, Brown DI, Whitlock K. PLoS One. 2026 Aug 11;21(8):e0348463. doi: 10.1371/journal.pone.0348463. eCollection 2026.PMID: 42579718

Neem-derived biopesticides are increasingly applied in agriculture and have been tested in aquaculture research, yet their effects on non-target aquatic invertebrates remain insufficiently characterized. We evaluated the effect of neem extract on the brine shrimp *Artemia franciscana* using an integrated ecotoxicological approach combining phenotypic, transcriptomic, and histological analyses. Juvenile *A. franciscana* exhibited dose-dependent mortality and sublethal abnormalities, with a 24 h median lethal concentration of 292.48 mg/L (95% confidence interval, 257.75-331.89) for mortality and a median effective concentration of 146.36 mg/L (95% confidence interval, 113.04-189.50) for the



combined endpoint "abnormal + dead". In adults, males showed greater mortality than females after extended exposure. High-throughput RNA sequencing revealed broad treatment-associated differences in transcript abundance, with juveniles displaying downregulation of detoxification enzymes and chitin biosynthesis genes, alongside enrichment of immune- and cuticle-related gene ontologies. Adults showed transcriptional signatures of stress, including upregulation of heat shock proteins and cytoskeletal components, and suppression of genes involved in energy metabolism. Chitin precursor enzymes were selectively downregulated in males, and altered carbohydrate metabolism was observed in females. Histological analyses showed treatment-associated alterations in the embryo-bearing brood sac region and reduced ovarian area in treated females. Overall, neem exposure was associated with phenotypic, histological, and transcriptomic changes in *A. franciscana*. These results support the use of combined transcriptomic and histopathological endpoints to characterize responses to plant-derived biopesticides in aquatic arthropods.

Neem For Sustainable Environment

[Comparative assessment of biological treatment and green chemistry approaches for industrial-scale textile wastewater remediation.](#)

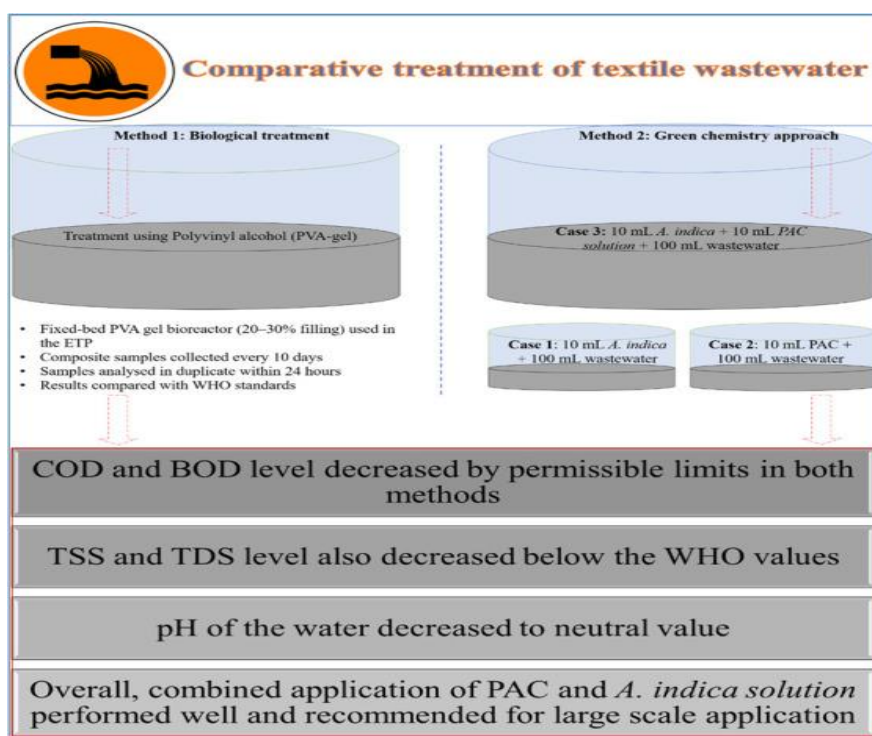
Atif Irshad M, Nawaz R, Tariq MS, Azeem S, Nasim I, Al-Hussain SA, Hussain N, Khairy M, Irfan A, Zaki MEA. RSC Adv. 2026 Aug 5. doi: 10.1039/d6ra03073d. PMID: 42558968

The textile sector releases dirty wastewater into the environment, which poses serious health and environmental concerns across the globe. The present study evaluated the textile wastewater treatment using two methodologies: biological treatment using polyvinyl alcohol (PVA) gel and a green chemistry strategy with *Azadirachta indica* leaf extract combined with polyaluminum chloride (PAC) solution. The physicochemical parameters such as BOD, COD, TDS, TSS, and pH levels were measured three times a week and compared with World Health Organization (WHO) standards. Toxic effects of both treated and untreated wastewater were evaluated by measuring the concentrations of heavy metals (Cr, Cd, and Pb) and inorganic salts (phosphate, ammonium, and sulfate) in the wastewater samples. The results of this comparison study demonstrated that both treatment procedures dramatically decreased pollutant loads, with the green chemistry method displaying greater efficacy. This method reduced the pH from 12.5 to 6.6, the COD from 855 to 47 mg L⁻¹, the

TDS from 5200 to 1500 mg L⁻¹, the TSS from 1600 to 110 mg L⁻¹, and the BOD from 340 to 20 mg L⁻¹.

Biological treatment improved several measures, but TDS and pH levels stayed above the permissible limits, while the green chemistry approach was found to be more effective at removing Cr, Cd, and Pb from the textile wastewater. Cr went from 1.3 to 0.233 mg L⁻¹, Cd went from 0.147 to 0.030 mg L⁻¹, and Pb went from

>0.01 to 0.347 mg L⁻¹. However, none of these levels reached WHO standards (Cr: 0.05, Cd: 0.003, and Pb: 0.01 mg L⁻¹). Salts: phosphate went down from 4.433 to 1.233 mg L⁻¹, ammonium went down from 8.733 to 3.3 mg L⁻¹, and sulfate went down from 429 to 220 mg L⁻¹. Overall, the *A. indica* + PAC green chemistry treatment proved more efficient than biological treatment alone, offering a cost-effective, eco-friendly, and scalable solution. However, advanced or integrated methods are recommended for achieving full compliance with international discharge standards.



[Investigation of the immunomodulatory influence of the flavonoid rich fraction of *Azadirachta indica* in *Plasmodium berghei* infected mice.](#)

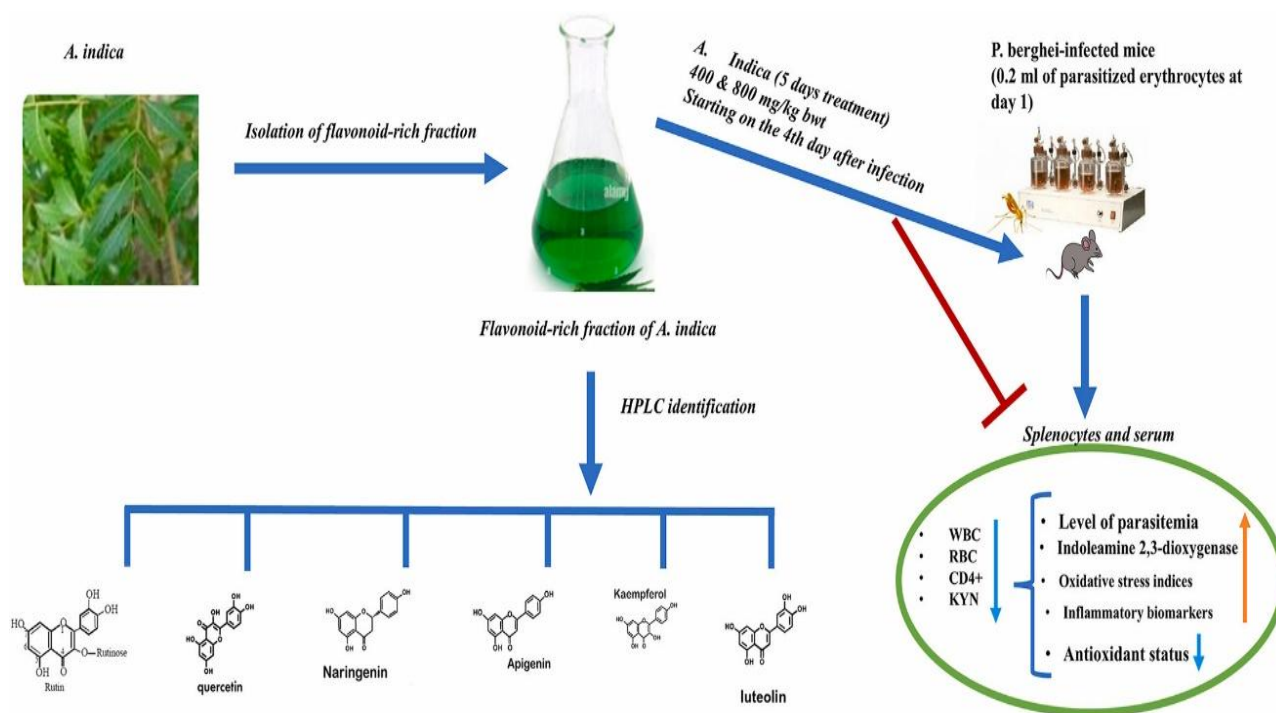
Obimma JN, Ekakitie LI, Dennis-Eboh U, Okoro N, Ndubuisi MN, Olasehinde O, Esievo JN, Ebokaiwe AP. *Microb Pathog.* 2026 Oct;219:108754. doi: 10.1016/j.micpath.2026.108754. Epub 2026 Aug 11. PMID: 42580430

Ethnopharmacological relevance: In Nigeria and other tropical and sub-tropical regions, *Azadirachta indica*, or neem, is a typical medicinal plant. In traditional medicine, its stem and leaves have been used to treat malaria.

Aim of the study: Through tryptophan catabolism and the likely mechanisms involved, we aim to examine the immunomodulatory potentials of flavonoid-rich fractions of *A. indica* extracts by regulating the splenic indoleamine 2, 3-dioxygenase (IDO), a crucial immune system regulator. This is to enunciate scientific proof and information about its therapeutic qualities for the treatment of malaria.

Materials and methods: Thirty-six mice weighing between 18 and 23 g were split into six groups at random, with six mice in each group. When parasitemia was clearly visible in the infected mice on day four, treatment of the mice in experimental groups B through F began.

Results: HPLC analysis showed the presence of naringenin, apigenin, kaemferol, luteolin, rutin, and quercetin. The various flavonoids identified in the FRF-Ai in the current study further highlighted its richness in flavonoid compounds. There was a time dependent increase in percentage parasitemia in the infected/untreated group, whereas, treatment with artesunate brought the level of the parasite to zero while treatment with FRF-Ai elicited a significant reduction in the level of the parasite and an attendant increase in the percentage inhibition of the parasite in a dose and time dependent manner. The integrated computational analyses revealed that rutin and naringenin elicited highest inhibition activity on indoleamine 2,3-dioxygenase (IDO) and tryptophan 2,3-dioxygenase (TDO) by occupying and stabilizing the enzymes' active sites. *P. berghei* infection resulted in the inhibition of antioxidant status and the elevation of lipid peroxidation and pro-inflammatory cytokine IL-6, MPO activity, and levels of NO in the splenocyte of the infected mice. Additionally, elevation in the serum kynurenine concentrations and activities of immunosuppressive IDO and TDO in the splenocytes of mice infected with *P. berghei* was conveyed by decrease in WBC, RBC, and CD4⁺ T cells, compared to the control group. However, the treatment with FRF-Ai exhibited a significant ($p < 0.05$) reversal in the altered parameters of immune response relative to the control group thereby counteracting immunosuppression. FRF-Ai could substantially control immune responses in malaria infection through the antioxidant, anti-inflammatory activities, by regulating Trp catabolism via IDO and TDO activity and hematological indices, ultimately leading to enhanced CD4⁺ T cell.



[Fabrication & characterization of neem oil-loaded hydrophobic PVA film for rapid hemostasis and minimizing blood loss in wound dressing.](#)

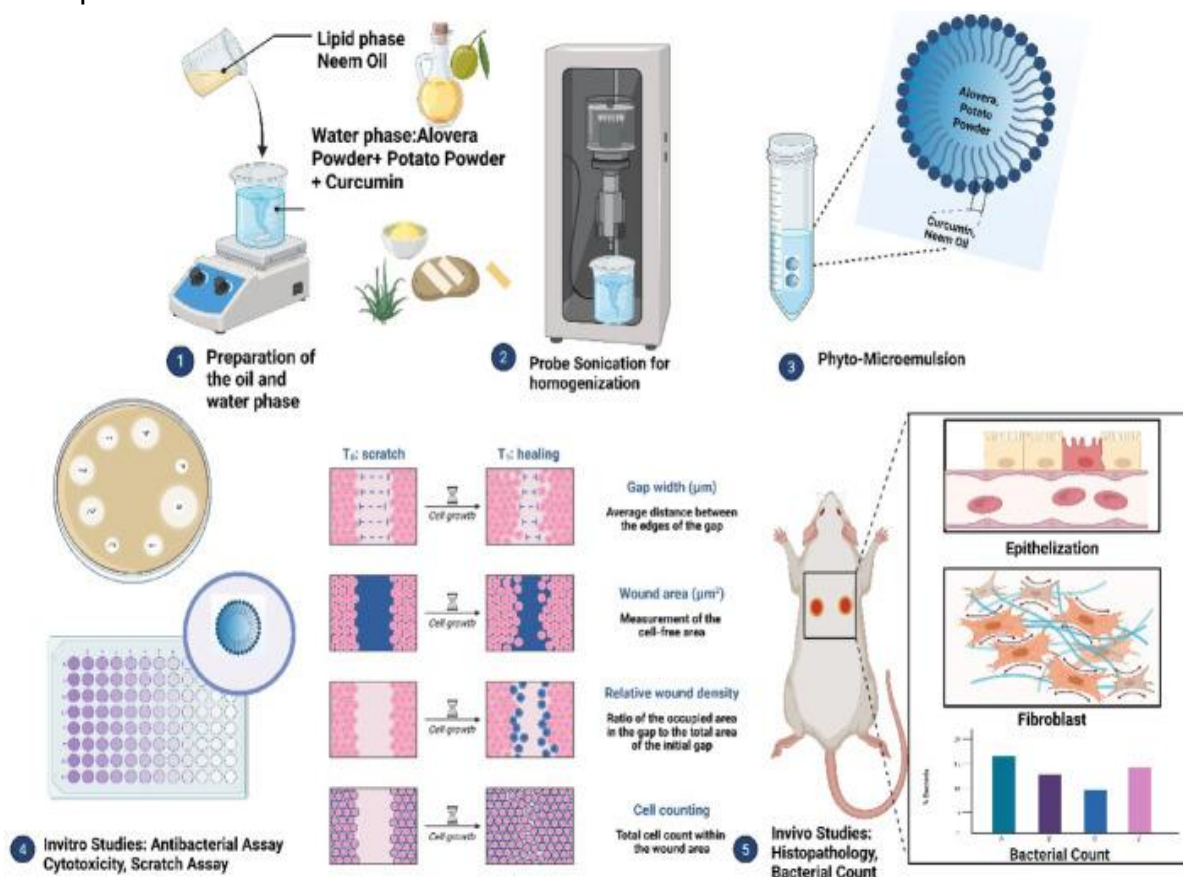
Rahman MH, Kadri HJ, Ahmed F, Nuruzzaman M, Mondal MIH. Biomed Mater. 2026 Aug 18. doi: 10.1088/1748-605X/ae9b57. PMID: 42615121

The objective of this investigation is to develop a dressing film with a blood-repellent surface to improve hemostatic performance while minimizing excessive blood loss from absorption and potentially reducing clot-dressing adhesion. As a result, a modified technique was utilized to fabricate a hydrophobic film made of PVA and neem seed oil. The developed film underwent multiple physicochemical studies to determine its structure and properties. The films exhibited increasing hydrophobicity with neem oil incorporation, as evidenced by water contact angle values rising from 47.8° (pure PVA) to 93.56° (PVA with 4% NSO), which suggests a potential reduction in adhesion risk. Kirby-Bauer agar diffusion assays demonstrated inhibition zones of up to 14 ± 0.1 mm against *Pseudomonas aeruginosa*, indicating preliminary antibacterial activity. Hemostatic evaluation revealed enhanced red blood cell and platelet adhesion, with the optimized PVA/NSO (A4) film exhibiting a blood clotting index (BCI) approximately 28% lower than that of the gauze control, indicating enhanced in vitro clotting efficiency compared with the gauze control. Qualitative assessment demonstrated that the films maintained good flexibility and structural integrity under bending, twisting, and stretching. Biodegradation studies showed weight loss of 25.7% for PVA/NSO films after 28 days, confirming environmental compatibility. Collectively, these results demonstrate that PVA/NSO composite films possess hydrophobicity, antibacterial activity, mechanical stability, and superior hemostatic performance, making them promising candidates for wound dressing and rapid hemostasis applications.

Synergistic phyto-formulated microemulsion for improved collagen deposition and healing of infected wounds.

Gumathannavar R, Londhe A, Kadam M, Sapre N, Dingre M, Kulkarni A, Koratkar S. *Discov Nano*. 2026 Aug 7;21(1):381. doi: 10.1186/s11671-026-04845-7. PMID: 42566097

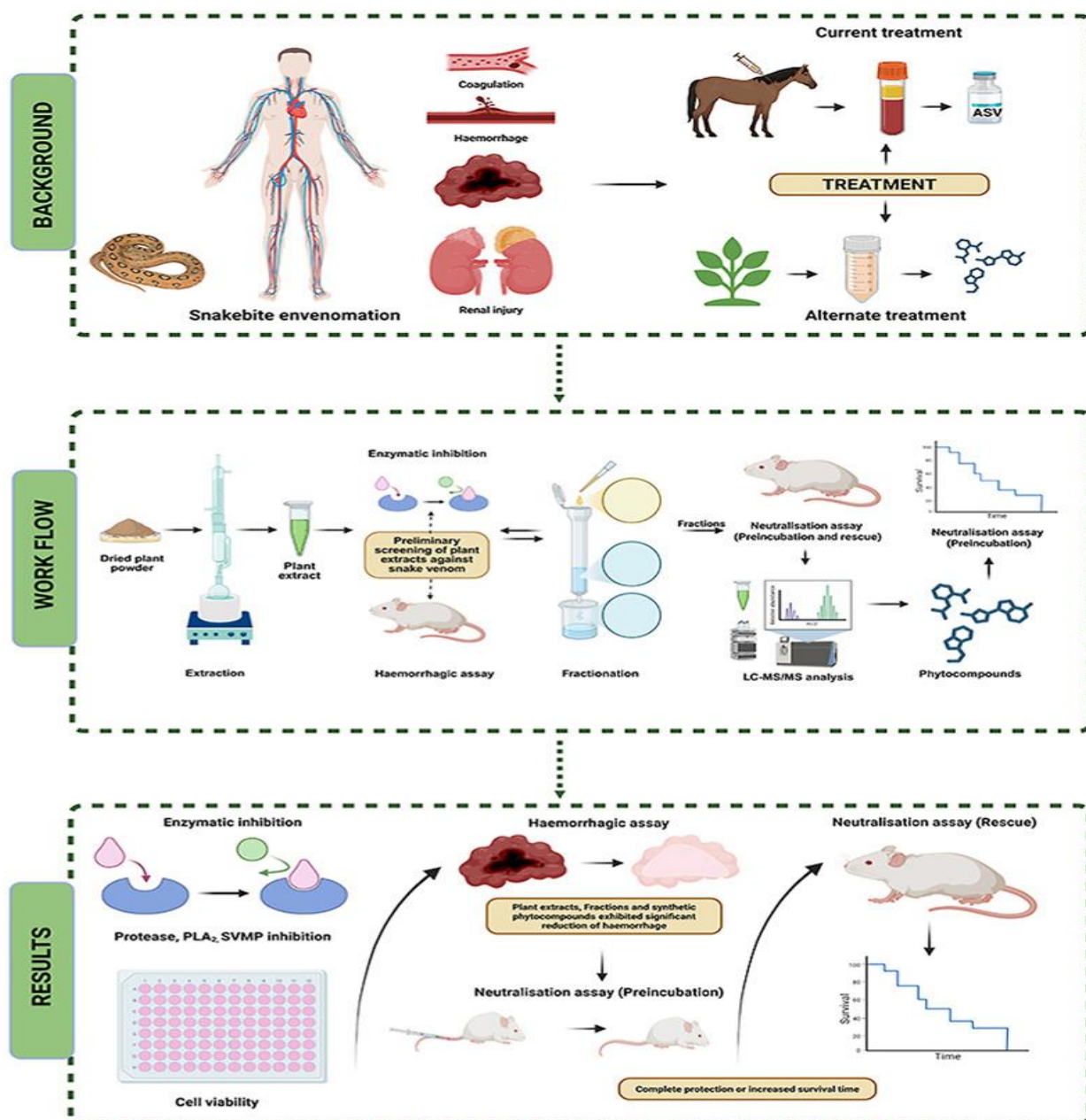
Chronic and infected wounds pose a major clinical challenge due to delayed healing, persistent inflammation, and impaired tissue regeneration. The present study aimed to develop and evaluate a phyto-based Microemulsion (Phy-ME) composed of potato peel powder, Himalayan Curcumin powder, neem oil, and Aloe Vera gel, focusing on its physicochemical stability, cell viability, antibacterial activity and wound-healing efficacy. The formulation was characterized using UV-visible spectroscopy, FTIR, zeta potential, and FE-SEM, confirming stable particle formation (-33.8 mV) with uniform dispersion and compatible phyto-constituents. In vivo studies were conducted on BALB/c mice with full-thickness excision wounds infected with *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The Phy-ME-treated groups, particularly at $250\text{ }\mu\text{g/mL}$, exhibited accelerated wound closure ($> 90\%$ by day 14), a reduced bacterial load, and improved granulation tissue formation compared to the controls. Histopathological analysis revealed dense collagen deposition, fibroblast proliferation, angiogenesis, and complete epithelialization in Phy-ME-treated tissues. The combined phyto-constituents exhibited synergistic antibacterial, antioxidant, and regenerative properties, promoting rapid wound recovery. This study demonstrates that Phy-ME serves as a biocompatible and sustainable formulation capable of improving collagen re-modeling and wound recovery, supporting its potential translation into therapies for chronic and infected wounds.



[Leaf to life: Harnessing medicinal plants as inhibitors of Russell's viper venom.](#)

Navanita S, Rudresha GV, Samanta A, Nayak M, Selvaraj H, Raman R, Sunagar K. *Toxicon*. 2026 Aug 2;282:109242. doi: 10.1016/j.toxicon.2026.109242. Online ahead of print. PMID: 42543086

Snakebite remains a major public health challenge, particularly in rural areas of the developing world. Although antivenom is the standard treatment, it often fails to adequately address local toxic effects, resulting in amputations and long-term disabilities. Among India's "big four" snakes, Russell's viper (*Daboia russelii*) is responsible for the greatest number of snakebite-related deaths and disabilities. This burden is exacerbated by delayed access to medical care and dependence on faith healers. Medicinal plants have long been used by traditional healers and tribal communities to treat snakebite. This study evaluated the inhibitory potential of medicinal plants, particularly those used by the Irula tribal community of southern India, against *D. russelii* envenoming. Among the tested plant extracts, *Azadirachta indica*, *Aristolochia bracteolata*, and *Enicostemma axillare* showed the strongest



inhibition of venom-induced haemorrhage and were selected for bioactivity-guided fractionation. Fractionated Plant Extract 5 (FPE5) from *A. indica* and *E. axillare* protected against venom-induced haemorrhage and lethality in vivo. LC-MS/MS analysis of *A. indica* FPE5 identified several phytochemicals, of which azelaic acid, gallic acid, catechin, and quercetin were evaluated using synthetic standards. Among these, azelaic acid, identified here for the first time as a snake venom-neutralising agent, showed the greatest inhibitory activity against venom-induced toxicities, effectively reducing haemorrhage and significantly prolonging survival in the preincubation lethality model. Overall, our findings demonstrate that medicinal plant extracts, their bioactive fractions, and phytochemicals can neutralise both local and systemic toxic effects of *D. russelii* venom, providing a foundation for developing adjunct or alternative snakebite therapies.

[A comprehensive review of *Azadirachta indica* \(Neem\): Exploring proximate composition, bioactive compounds, and prospects for antimicrobial activity.](#)

Priyanka G, Gowripriya T, Mounish BSC, Trinath MN, Stanislaus JB, Bhaskar JP, Pandian SK, Balamurugan K. *Biochem Biophys Rep.* 2026 Aug 8;47:102730. doi: 10.1016/j.bbrep.2026.102730. eCollection 2026 Sep. PMID: 42603958

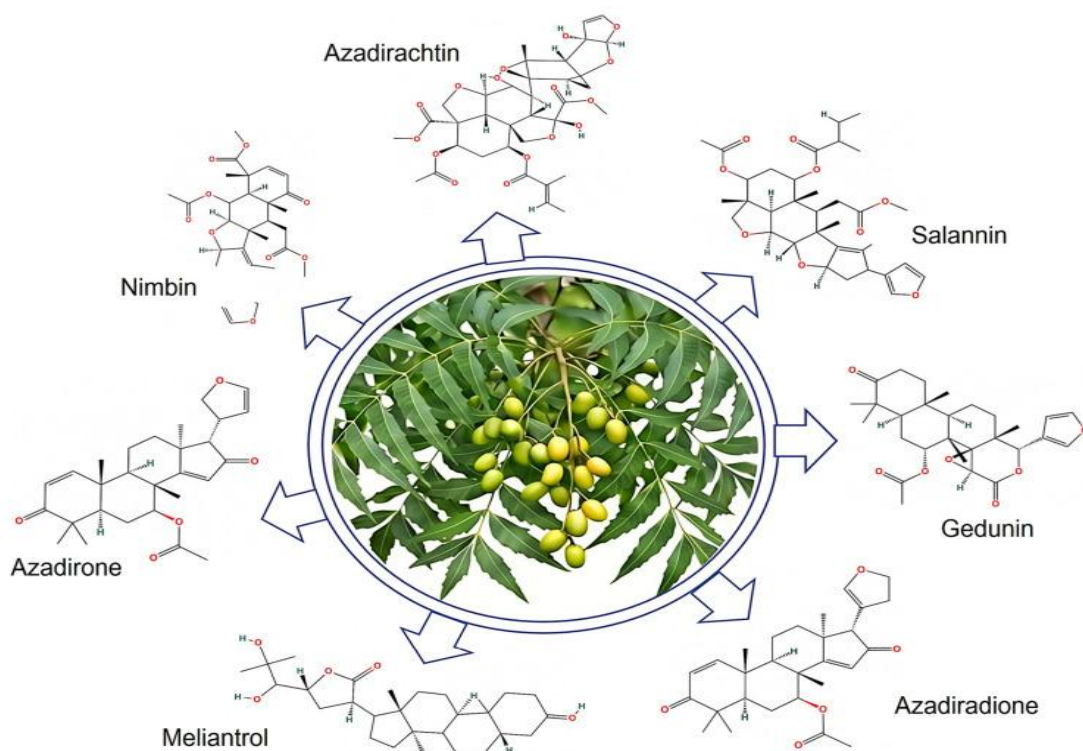
Neem, or *Azadirachta indica* A. Juss., is a tree that is both versatile and native to the Indian subcontinent and Southeast Asia. It is frequently employed in traditional medicine to treat skin issues and pyrexia, as well as for environmental protection and insect control. This review reports the multifaceted potential of *A. indica*, a plant that is profoundly rooted in traditional medicine. Neem has high value due to its rich composition of bioactive compounds, and in particular, has a potential for combating several pathogenic microbial communities. There is an increasing necessity to identify novel antimicrobial agents in light of the alarming increase in drug-resistant pathogens. Neem stands out as a promising option, showcasing a wide range of therapeutic benefits that go beyond just treating common issues like fever and skin problems. Its bioactive compounds boast impressive medicinal properties, offering anti-inflammatory, antimicrobial, and immunomodulatory effects that can be incredibly useful for tackling complex health conditions. This review emphasizes the importance of methods of bioactive extraction and biochemical features of neem leaf extracts. There are many bioactive substances such as, triterpenes, flavonoids, and phenolics that contribute to the plant's antibacterial, anti-inflammatory, and antioxidant properties. In addition, this review discusses the immunomodulatory effects and the influence of various extraction solvents on the yield and composition of bioactive compounds.

[Antileishmanial Activity of Bioactive Compounds Obtained from *Azadirachta indica* and *Cnidioscolus* spp.: Systematic Review.](#)

Yaima-Yate JA, Lapuente-Chala C, Urrea-Montes DA, Céspedes-Rubio ÁE. *Molecules.* 2026 Jul 28;31(15):2630. doi: 10.3390/molecules31152630. PMID: 42588479

Leishmaniasis, a poorly studied tropical disease, has major therapeutic limitations, driving the search for safer, effective treatments. This review assessed scientific evidence on the antileishmanial activity of extracts, fractions, and bioactive compounds from *Azadirachta indica* and *Cnidioscolus* spp. in in vitro and in vivo studies. Following PRISMA 2020 guidelines, searches were conducted in PubMed/MEDLINE, Scopus, ScienceDirect, and Google Scholar. Eligible studies reported quantitative outcomes, including IC₅₀/EC₅₀ values,

percentage inhibition, parasite load reduction, cytotoxicity, or selectivity index. Systematic reviews, studies without quantitative data, and unvalidated in silico studies were excluded. Overall, 87 records were identified, and 14 studies were included in the synthesis. Most evidence focused on *A. indica* derivatives tested against different Leishmania species, mainly in vitro, although some studies used BALB/c and CD-1, mouse models. Active fractions generally showed greater potency against intracellular amastigotes than promastigotes, with activity varying by fraction and model. In vivo studies with *A. indica* preparations reported reduced parasite loads and improved lesions. Evidence for *Cnidoscolus* spp. was limited and variable. Overall, plant-derived compounds show



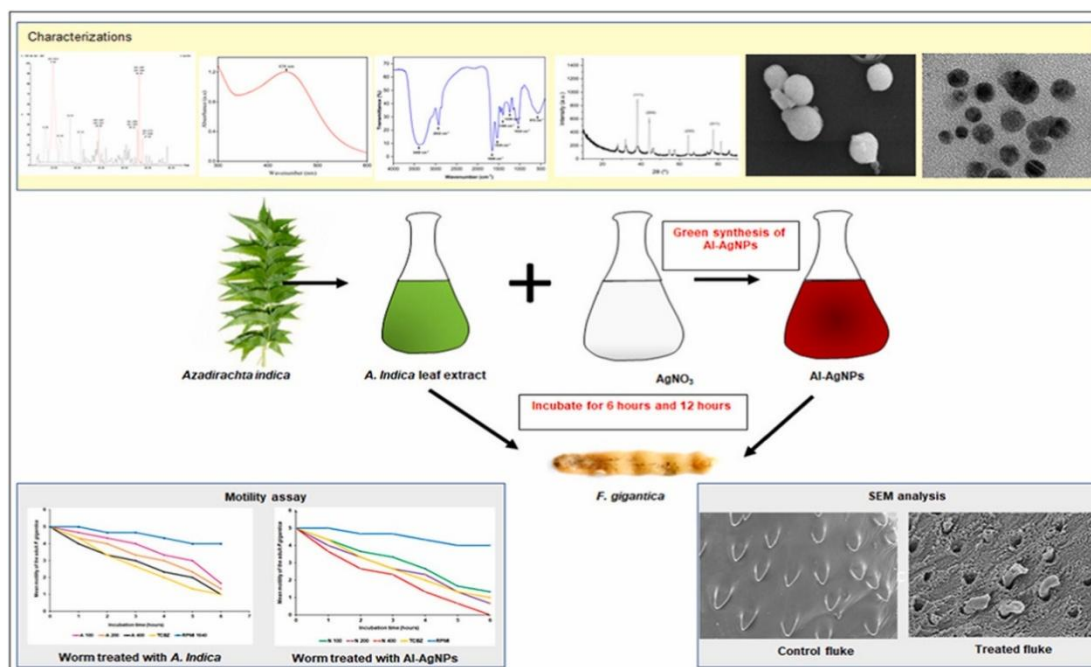
promising antileishmanial potential, but rigorous comparative studies are needed to strengthen evidence-based phytopharmaceutical development for leishmaniasis and to clarify the most active compounds, doses, formulations, and therapeutic targets across models.

[Green synthesized silver nanoparticles of neem extract for effective anthelmintic activity against tropical liver fluke, *Fasciola gigantica*.](#)

Ummukulsoom OP, Ahammed Shareef PA. Microb Pathog. 2026 Aug 18;220:108779. doi: 10.1016/j.micpath.2026.108779. Online ahead of print. PMID: 42612928

The digenean trematodes *Fasciola hepatica* and *F. gigantica* are the major causative agents of human and animal fasciolosis worldwide. Control of fasciolosis relies mainly on chemotherapeutic drugs, particularly triclabendazole (TCBZ). However, the emergence of drug resistant flukes necessitates the need for alternative control strategies. Plant derived compounds and their nanoparticle formulations have recently attracted attention as potential anthelmintic agents due to their bioactivity, biocompatibility and lower risk of development

of resistance. The present study evaluated the in vitro anthelmintic efficacy of ethanolic leaf extract of *Azadirachta indica* and its green synthesized silver nanoparticles (AI-AgNPs) against adult *F. gigantica*. The *A. indica* leaf extract and AI-AgNPs were prepared and characterized using standard protocols. The adult flukes of *F. gigantica* were incubated in RPMI-1640 medium containing 100, 200 and 400 µg/ml of *A. indica* leaf extract, AI-AgNPs or 15 µg/ml TCBZ (serving as positive control), at 37 ± 1 °C. Parasite motility was assessed hourly for up to 6 h of incubation, whereas tegumental morphological alterations were evaluated by scanning electron microscopy (SEM) following incubation for 6 and 12 h. AI-AgNPs induced a faster and more pronounced reduction in worm motility compared with the crude extract of *A. indica*. SEM revealed concentration and time dependent tegumental alterations, including swelling, blebbing, furrowing, erosion, desquamation and spine loss. Among these three compounds tested, AI-AgNPs produced more severe damage than the crude extract and TCBZ. Damage was more pronounced on the ventral surface and posterior region of the fluke. The present study highlights the potential of AI-AgNPs as a promising alternative for the control of fasciolosis.



[Integrated Phytochemical Profiling, Spectroscopic Analysis, and Molecular Docking Evaluation of Ethanolic Plant Extracts Against Candida Receptor \(1IYK\).](#)

Philip JM, Mahalakshmi K, Abraham HM, Sankar LS.J Fungi (Basel). 2026 Aug 1;12(8):573. doi: 10.3390/jof12080573.PMID: 42646100

Background: The increasing prevalence of antifungal resistance among *Candida albicans* isolates necessitates the exploration of alternative antifungal strategies and novel molecular targets. Plant-derived bioactive compounds represent a promising source of antifungal agents; however, their chemical composition and mechanisms of action remain insufficiently characterized. **Methods:** Ethanolic extracts of *Azadirachta indica* leaves and *Ficus benghalensis* aerial roots were subjected to qualitative phytochemical screening, gas chromatography-mass spectrometry (GC-MS), and Fourier transform infrared (FTIR) analysis to characterize their bioactive constituents. Molecular docking studies were performed to evaluate the interaction of selected phytochemicals with *C.*

albicans N-myristoyltransferase (PDB ID: 1IYK), a validated antifungal drug target. **Results:** Phytochemical screening revealed the presence of alkaloids, carbohydrates, and phenolic compounds in both extracts, while saponins were detected only in *A. indica*. GC-MS analysis demonstrated greater chemical diversity in *A. indica*, including fatty acids and phenolic derivatives, compared with *F. benghalensis*, which was dominated by terpenoids and long-chain hydrocarbons. FTIR analysis confirmed functional groups relevant to protein-ligand interactions. Molecular docking showed favorable binding interactions between several *A. indica*-derived compounds and N-myristoyltransferase, whereas compounds from *F. benghalensis* did not exhibit detectable binding under the conditions tested. **Conclusions:** The integrated phytochemical and in silico analyses provide insight into the antifungal potential of *A. indica*, suggesting possible interactions between identified phytochemicals and the selected drug target protein. This study highlights the value of combining chemical characterization with target-based computational screening in the rational exploration of plant-derived antifungal agents.

[Azadiradione regulates heat shock factor 1 function by interacting with its DNA-binding domain independent of the oligomerization domain.](#)

Manna A, Basak P, Majumder C, Hazra N, Halder S, Jana K, Mukhopadhyay J, Mandal SC, Pal M. FEBS J. 2026 Aug 11. doi: 10.1111/febs.70677. Online ahead of print. PMID: 42578375

Heat shock factor 1 (HSF1) masters cellular proteostasis under stress by upregulating molecular chaperones that help refold or degrade misfolded proteins. HSF1 activation involves its monomer-to-oligomer transition and binding to its recognition sequence: the heat shock elements (HSEs) on its target gene promoters. HSF1 activity declines with age as well as in neurodegenerative disorders (NDs) such as Parkinson's disease, highlighting the need for therapeutic strategies to restore its function. Azadiradione (AZD), a limonoid isolated from *Azadirachta indica* seeds, directly activates HSF1 in cellular and preclinical ND models, unlike other small-molecule activators reported elsewhere. In this study, the molecular basis of AZD-mediated HSF1 activation was investigated using purified variants of HSF1, including those lacking its oligomerization and transactivation domains. Fluorescence polarization and dynamic light scattering assays revealed that AZD promotes the oligomerization of monomeric HSF1 to enhance its HSEs-binding affinity by engaging its DNA-binding domain (DBD). The oligomerization domain, which is required for stress-induced HSF1 activation, appears redundant in AZD-mediated activation. Furthermore, evidence suggests that AZD-induced conformational alterations in the HSEs-DNA facilitate its binding to the HSF1 monomer. Intriguingly, AZD was found to compromise the DNA-binding ability of pre-assembled trimeric/oligomeric HSF1. This finding also highlighted a potential anticancer effect of AZD, as cancer cells heavily depend on this HSF1 population for rapid proliferation and survival. Overall, these findings offer new insights into the functional regulation of HSF1 and suggest a framework for developing small-molecule HSF1 activators with therapeutic potential for protein conformational disorders.

[Epoxyazadiradione, a neem-derived limonoid exhibits activities against pancreatic cancer through modulation of inflammatory molecules, lncRNAs, ROS, and EMT.](#)

Rai V, Srivastava A, Shekher A, Dutta A, Gupta SC. *Biochim Biophys Acta Gen Subj*. 2026 Jun;1870(6):130938. doi: 10.1016/j.bbagen.2026.130938. Epub 2026 Mar 23. PMID: 41881140

Pancreatic cancer is the seventh most prevalent cancer worldwide, with persistently low life expectancy that hasn't changed for many decades. Agents derived from Mother Nature has been emphasised for drug development due to their safety, affordability, and ability to modulate multiple cell signalling pathways. Among such agents, azadiradione (AZA) and epoxyazadiradione (EPA) are two limonoids derived from the neem plant (*Azadirachta indica*). Both of these limonoids are reported to exhibit cytotoxic activities against some cancer types. However, the potential of EPA and AZA against pancreatic cancer and the underlying mechanism has not been reported earlier. In this study, we investigated the potential of EPA and AZA against pancreatic cancer cells. Our results demonstrated that EPA possess greater cytotoxic potency against pancreatic cancer compared to AZA while non-malignant epithelial cells were only minimally affected by the limonoid. Further, EPA triggered apoptosis in pancreatic cancer cells as revealed by morphological changes, DNA fragmentation, cell cycle arrest, and annexin-V staining. EPA also induced ROS generation and altered the mitochondrial membrane potential. EPA inhibited the translocation of NF- κ B-p65 and downregulated the expression of proteins related to cell survival (Bcl-xL, Bcl-2, survivin) and invasion (MMP-9), while inducing the proapoptotic protein (Bax). The expression of lncRNAs was modulated, and the gene silencing of GAS5 reversed the effects of EPA in pancreatic cancer lines. It also enhanced the sensitivity of cell lines to paclitaxel, decreased the spheroid formation and modulated the expressions of EMT markers. These cumulative findings revealed that EPA exhibits anti-cancer activity against pancreatic cancer.

[Chemoprotective of Nimbolide Against Diethylnitrosamine Induced Hepatic Cancer via Alteration of NF-kappaB and PI3K/Akt/mTOR Signaling Pathways.](#)

Zhang S, Chen Q, Peng S, Zeng X, Ouyang J.J *Biochem Mol Toxicol*. 2026 May;40(5):e70767. doi: 10.1002/jbt.70767. PMID: 42121400

Hepatocellular carcinoma (HCC) is the 5th rank among all types of cancers, the incidence of the HCC increases globally. The current study was scrutinized the chemoprotective effect of nimbolide against dimethylnitrosamine (DEN) induced HCC in rats via alteration of PI3K/Akt/mTOR signaling pathways. Intraperitoneal administration of DEN (200 mg/kg) was used for the induction of HCC in the rats and rats were received the oral administration of nimbolide (10, 20, and 40 mg/kg). The body weight, liver weight, liver index, electrolyte, membrane bound enzymes, antioxidant, inflammatory cytokines, inflammatory parameters and apoptosis parameters were estimated. The mRNA expressions were estimated in the hepatic tissue. Nimbolide treatment improved the body weight and diminished the liver weight and liver index. Nimbolide treatment altered the electrolyte (sodium, potassium, calcium, magnesium), membrane bound enzymes, antioxidant parameters cytokines (tumor

necrosis factor- α (TNF- α), interleukin-1 β (IL-1 β), interleukin-2 (IL-2), interleukin-6 (IL-6), interleukin-7 (IL-7), interleukin-10 (IL-10), interleukin-17 (IL-17), interleukin-18 (IL-18)), inflammatory parameters (cyclooxygenase-2 (COX-2), prostaglandin (PGE2), inducible nitric oxide synthetase (iNOS), nuclear factor kappa B (NF- κ B), vascular endothelial growth factor (VEGF)), apoptosis parameters such as B-cell lymphoma 2 (Bcl-2), Bcl-2-associated X protein (Bax), Bcl-2:Bax ratio, cysteine-aspartic acid protease-3 (caspase-3) and C-reactive protein (CRP) level. Nimbolide treatment significantly ($p < 0.001$) altered the mRNA expression of tumor protein p53 (p53), Bax, Mechanistic target of rapamycin (mTOR), Bcl-2, Cysteine-aspartic acid protease-9 (caspase-9), caspase-3, phosphoinositide 3-kinase (PI3K), IQ motif-containing GTPase-activating protein 1 (IQGAP1), Protein kinase B (PKB) (AKT), IQ motif-containing GTPase-activating protein 2 (IQGAP2), IQ motif-containing GTPase-activating protein 3 (IQGAP3), Kirsten rat sarcoma viral oncogene homolog (KRAS) and Harvey rat sarcoma viral oncogene homolog (HRAS). The result clearly showed the chemoprotective effect of nimbolide against DEN induced HCC in rats via alteration of PI3K/Akt/mTOR signaling pathways.

[Nimbolide Reduces Inflammation and Oxidative Stress to Inhibit Disease Progression in Septic Acute Kidney Injury Mice.](#)

Yu Y, Li Y, Gong Y. Arch Immunol Ther Exp (Warsz). 2026 Aug 22;74(1). doi: 10.2478/aite-2026-0023. eCollection 2026 Jan 1. PMID: 42632097

The study investigates the protective role of Nimbolide, a natural limonoid, against sepsis-associated acute kidney injury (SA-AKI) and its underlying molecular mechanisms. A murine sepsis model was established via cecal ligation and perforation. Renal histopathological changes were evaluated by hematoxylin and eosin staining, and renal function was assessed based on serum creatinine (Scr) and blood urea nitrogen (BUN) levels. The levels of inflammatory cytokines (interleukin-6 [IL-6], interleukin-1 β [IL-1 β], tumor necrosis factor- α [TNF- α]) in serum and renal homogenates were quantified by ELISA. Oxidative stress markers (malondialdehyde [MDA], superoxide dismutase [SOD], glutathione [GSH]) in renal tissue were measured using commercial assay kits. Renal cell apoptosis was detected by transferase dUTP nick end labeling (TUNEL) assay. Also, the protein expression and phosphorylation levels of nuclear factor kappa B (NF- κ B) p65 and STAT3 in renal tissues were analyzed by Western blotting. Nimbolide treatment markedly attenuated tubular vacuolization and inflammatory cell infiltration, and improved renal function, as demonstrated by reduced serum Scr and BUN levels. Nimbolide also suppressed the levels of the pro-inflammatory cytokines (IL-6, IL-1 β , TNF- α) in both serum and renal tissue. Furthermore, Nimbolide decreased MDA levels, increased SOD activity and GSH content, and inhibited renal apoptosis. Mechanistically, these protective effects were associated with the inhibition of NF- κ B p65 and STAT3 phosphorylation in the kidneys. Nimbolide protects against SA-AKI by inhibiting activation of the NF- κ B/STAT3 pathway, thereby attenuating inflammation, oxidative stress, and apoptosis.

[Neem tree foliage as a substitute for Rhodes grass hay: effects on ruminal fermentation, intake, and digestibility in dry cows.](#)

Youcef KA, Al Hinai MH, El-Zaiat HM. Trop Anim Health Prod. 2026 Aug 5;58(7):478. doi: 10.1007/s11250-026-05280-7. PMID: 42554926

The use of tree and shrub foliage has gained increasing attention as a sustainable feeding strategy for ruminants in arid regions. This study evaluated the effects of progressively replacing Rhodes grass hay (RGH) with partially dehydrated fresh neem tree foliage (NTF) on in vitro ruminal fermentation and in vivo dry matter (DM) intake, nutrient digestibility, and blood biochemical parameters in dry cows. Four diets were formulated in which RGH replaced NTF at 0%, 33%, 66%, and 100% of the forage component. In vitro, increasing NTF inclusion resulted in linear increases in total volatile fatty acid concentration ($P = 0.039$), propionate ($P = 0.028$), gas production ($P = 0.021$), CO_2 production ($P = 0.039$), and truly degraded organic matter ($P = 0.043$), while acetate-to-propionate ratio ($P = 0.021$), and methane (CH_4) production decreased linearly ($P = 0.048$). In vivo, DM, OM, CP, and NDF intakes and apparent digestibility increased quadratically ($P < 0.01$), peaking at intermediate inclusion levels (up to 66%) in cows diet. In addition, increasing NTF inclusion linearly increased red blood cell count ($P = 0.014$), hemoglobin concentration ($P = 0.024$), and serum glucose levels ($P = 0.023$). In conclusion, partial replacement of RGH with NTF (up to 66% of forage DM) reduced ruminal CH_4 production and improved fermentation characteristics under in vitro conditions. Moreover, it improved feed dry matter intake and nutrient digestibility without adversely affecting cow health, highlighting the potential of NTF as a promising forage resource for dry cows feeding in arid regions.