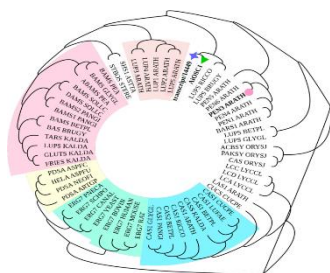


Neem Research Newsletter

Volume 6, Issue 9, 2026



WORLD NEEM ORGANISATION (WNO)



From

The Editor's Desk.....

In this Issue of the Neem Newsletter several research findings have unravelled the potential of neem in different frontiers of activity. In a field study conducted in Maharashtra integration of botanical formulations such as neem and eucalyptus oil with need-based insecticidal applications, emerged as a safer and more eco-friendly alternative for pest management in rice cultivation. A chitosan polymer based azadirachtin nanoemulsion developed to improve the stability and insecticidal efficacy of azadirachtin against cotton aphid *Aphis gossypii* under laboratory and field conditions offered enhanced biological efficacy, highlighting its potential as an environmentally safer alternative to conventional insecticides. Azadirachtin-loaded mesoporous silica nanoparticles exhibited fast-acting insecticidal activity against mangrove defoliator offering a novel eco-friendly technical approach to achieve rapid emergency control of *H. puera* outbreaks.

A study on urban afforestation in Maranhão, Northeast Brazil involving analysis of a total of 317 trees from 16 families and 32 species reported *A. indica* as the most abundant and versatile tree useful for shading, ornamentation and in the treatment of diseases. Neem leaf powder was investigated for the treatment of Sirsa River water contaminated with organic pollutants and heavy metals.

In a narrative review of neem, quantitative and mechanistic synthesis of neem's phytochemical diversity and pharmacological landscape was highlighted, by mapping over 140 bioactive compounds to specific molecular pathways and clinical potential, while critically evaluating translational barriers. In a randomized double-blind crossover study conducted on 40 students (12-15 years), 12 hours of soaking contaminated toothbrushes in 5% neem significantly reduced bacterial counts compared to baseline. Fermentation of neem leaves with combination of yeast (*Saccharomyces cerevisiae*), bacteria (*Lactobacillus plantarum*), and fungi (*Aspergillus niger*), was found to be effective in treatment of pattern hair loss. The neem limonoid nimbolide was demonstrated to exert anti-atherosclerotic effects underscoring its potential in the management of cardiac diseases. In another study, UV irradiation was shown to transform neem oil into a more potent antimicrobial, antibiofilm, and anticancer agent against skin cancer cells. Researchers have also provided evidence to indicate the therapeutic potential of turmeric, neem and Shatavari in combating ovarian cancer. Neem leaf glycoprotein, an immunomodulatory component of neem leaf preparation was found to promote tumor-protective immunity in acute myeloid leukaemia through coordinated immune activation and epigenetic regulation, supporting its potential as a novel adjunctive immunotherapeutic strategy.

S. Nagini
Core Founding Member &
Chief Scientific Advisor



Neem in Agriculture

[Comparative evaluation of module-based strategies for controlling lepidopterous and dipterous pests in rice \(*Oryza sativa* L.\) cultivation.](#)

Humane AN, Undirwade DB, Chaudhari BN, Kulakrni US, Borkar SL, Shamkuwar GR, Mohril MP, Gawdiya S, Salem A, Mattar MA. BMC Plant Biol. 2026 Aug 6;26(1):1517. doi: 10.1186/s12870-026-09601-8. PMID: 42693406

Background: Rice cultivation in eastern Vidarbha region of Maharashtra is seriously affected by insect pests such as yellow stem borer, gall midge, and leaf folder. Farmers in this region mainly depend on repeated application of single chemical insecticides, which has led to the development of insecticide resistance and associated environmental concerns. To address this problem, a field experiment entitled "Comparative evaluation of module-based strategies for controlling lepidopterous and dipterous pests in rice (*Oryza sativa* L.) cultivation" was conducted during kharif 2020 and 2021 at the Agriculture Research Station, Bhandara, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra (India). The study was undertaken to evaluate the effectiveness of different pest management modules in reducing pest incidence and improving the rice grain yield.

Results: The results revealed that all the treatment modules significantly reduced the incidence of major rice pests compared to untreated control. Among the tested modules, M4 comprising chlorantraniliprole 0.4% G, cartap hydrochloride 50% SP, and Dinotefuran 20% SG was found to be the most effective in controlling yellow stem borer, gall midge, and leaf folder. Besides the chemical module, module M1 consisting of Neemazal 1% EC applied at 25-30 days after transplanting (DAT), eucalyptus oil at 45-50 DAT, and cartap hydrochloride 50% SP at 60-65 DAT also showed promising performance against the target pests. Rice grain yield was significantly ($P < 0.05$) higher in both M4 and M1. The study further indicated that botanical-based modules supported comparatively better conservation of natural enemies under field conditions.

Conclusions: Among the evaluated pest management modules, M4 demonstrated the most effective suppression of major rice pests and achieved the highest grain yield. However, M1, integrating botanical formulations such as neem and eucalyptus oil with need-based insecticidal applications, emerged as a safer and more eco-friendly alternative. The study highlights that combining botanicals with selective insecticides can substantially reduce chemical dependence while maintaining effective pest control and crop productivity. These findings provide actionable guidance for farmers and policymakers to promote environmentally responsible pest management practices in rice cultivation systems.

[From nanoformulation to field performance: A sustainable biopolymer-based azadirachtin nanoemulsion for *Aphis gossypii* management.](#)

Murugesan V, Malaichamy K, Thirumurugan NK, Selvaraj D, Sakthiyavathi SSK, Kamalakannan M, Raga Palanisamy S, Angappan S, Alagesan S, Murugaiyan S, Kuppusamy R, Kasivelu G. Colloids Surf B Biointerfaces. 2026 Sep 7;269:116162. doi: 10.1016/j.colsurfb.2026.116162. Online ahead of print. PMID: 42721619

This study developed a chitosan polymer based azadirachtin nanoemulsion (ANE) to improve the stability and insecticidal efficacy of azadirachtin against cotton aphid *Aphis gossypii* under laboratory and field conditions. The optimized ANE exhibited excellent physicochemical stability, with a hydrodynamic diameter of nanoemulsion droplets size of 137.6 nm and a zeta potential of + 43.1 mV, confirming the formation of a stable nanoemulsion. The TEM micrograph showed spherical to slightly oval-shaped droplets with an average size of 32.5 nm. Laboratory bioassays ANE exhibited superior insecticidal activity of 76.67% mortality at 400 ppm after 72 h, with LC₅₀ and LC₉₀ values of 165.57 and 898.31 ppm, respectively, and achieved 93.33% repellency at the LC₅₀ concentration after 24 h. Enzyme activity analysis revealed increased glutathione S-transferase (GST) activity together with suppression of mixed-function oxidase (MFO), carboxylesterase (CarE), and acetylcholinesterase (AChE), suggesting disruption of detoxification and neural functions in the aphid. Molecular docking studies further supported the findings by demonstrating strong binding affinities of azadirachtin with key detoxification enzymes, particularly carboxylesterase (-14.8 kcal/mol) and acetylcholinesterase (-6.4 kcal/mol). Field evaluation confirmed the practical effectiveness of ANE, with the 30 and 25 mL/L treatments reducing aphid populations by 91.09% and 88.00%, respectively. Overall, these findings indicate that the ANE offers enhanced biological efficacy, highlighting its potential as an environmentally safer alternative to conventional insecticides for sustainable management of *A. gossypii* in cotton.

[Construction of Azadirachtin-Loaded Mesoporous Silica Nanoparticles and Their Fast-Acting Insecticidal Activity Against the Mangrove Defoliator *Hyblaea puera*.](#)

Wang M, Liu Y, Gao S, Chang M, Cao L, Zhu Y. *Nanomaterials* (Basel). 2026 Aug 31;16(17):1083. doi: 10.3390/nano16171083. PMID: 42726559

Mangrove ecosystems represent critical coastal blue carbon sinks, whose ecological stability is essential for sustaining carbon sequestration capacity and coastal ecological security. *Hyblaea puera*, a dominant defoliating pest in mangrove habitats, exhibits abrupt population outbreaks and extreme destructive potential, severely threatening the integrity of blue carbon ecosystems. While conventional broad-spectrum chemical insecticides deliver adequate control efficacy, they often exert detrimental effects on non-target organisms and adjacent coastal marine environments, conflicting with core mangrove conservation objectives. Azadirachtin, a botanical insecticide with high lepidopteran target highly selective, is a promising eco-friendly alternative; nevertheless, the dual stresses of periodic tidal flushing and intense ultraviolet radiation in intertidal mangrove habitats drive rapid photodegradation and leaching loss of azadirachtin, leading to poor field persistence and slow lethal action of the free formulation. These limitations render neat azadirachtin insufficient to meet the urgent demand for rapid emergency control of *H. puera* during population outbreaks. To address these technical bottlenecks, we developed an azadirachtin-loaded dendritic mesoporous silica nanoparticle delivery system to simultaneously improve the environmental stability and fast-acting insecticidal efficacy of azadirachtin against *H. puera*. Specifically, dendritic mesoporous silica nanoparticles (DMSNs) were synthesized via a one-pot method, then loaded with azadirachtin (ADT) and further surface-modified with polyether-modified heptamethyltrisiloxane (PM) to

fabricate the ADT@DMSN/PM nano-delivery system. The physicochemical properties, intertidal habitat adaptability, insecticidal activity, and environmental safety of the fabricated system were systematically evaluated. Characterization results showed that the as-synthesized DMSNs had a uniform particle size of 200-300 nm, a specific surface area of 260.99 m²/g, and an ADT loading efficiency of 66.6%. ADT@DMSNs exhibited prominent alkaline-responsive sustained-release behavior, with a cumulative ADT release of 57.0% at pH 8.2 (mangrove seawater conditions) over 500 h. Laboratory bioassays revealed that the 24 h median lethal concentrations (LC₅₀) of ADT@DMSNs against third-, fourth-, and fifth-instar *H. puera* larvae were 84.36, 188.08, and 458.65 µg/mL, respectively, representing 2.38-, 2.63-, and 2.86-fold enhancements in insecticidal activity compared with free ADT. After modification with the PM adjuvant, the nanoformulation exhibited a significantly reduced contact angle on *Avicennia marina* leaves, over 3-fold higher foliar penetration efficiency, and markedly improved tidal wash-off resistance. Field cage bioassays demonstrate that the ADT@DMSN/PM nanoformulation yields a corrected mortality of approximately 95% against *H. puera* larvae at 1200 mg/L at 24 h. This nano-delivery system is precisely tailored to the unique environmental constraints of mangrove intertidal habitats, offering a novel eco-friendly technical approach to achieve rapid emergency control of *H. puera* outbreaks.

Neem For Sustainable Environment

[Selection and uses of species in urban afforestation in Maranhão, Northeast Brazil: an ethnobotanical approach.](#)

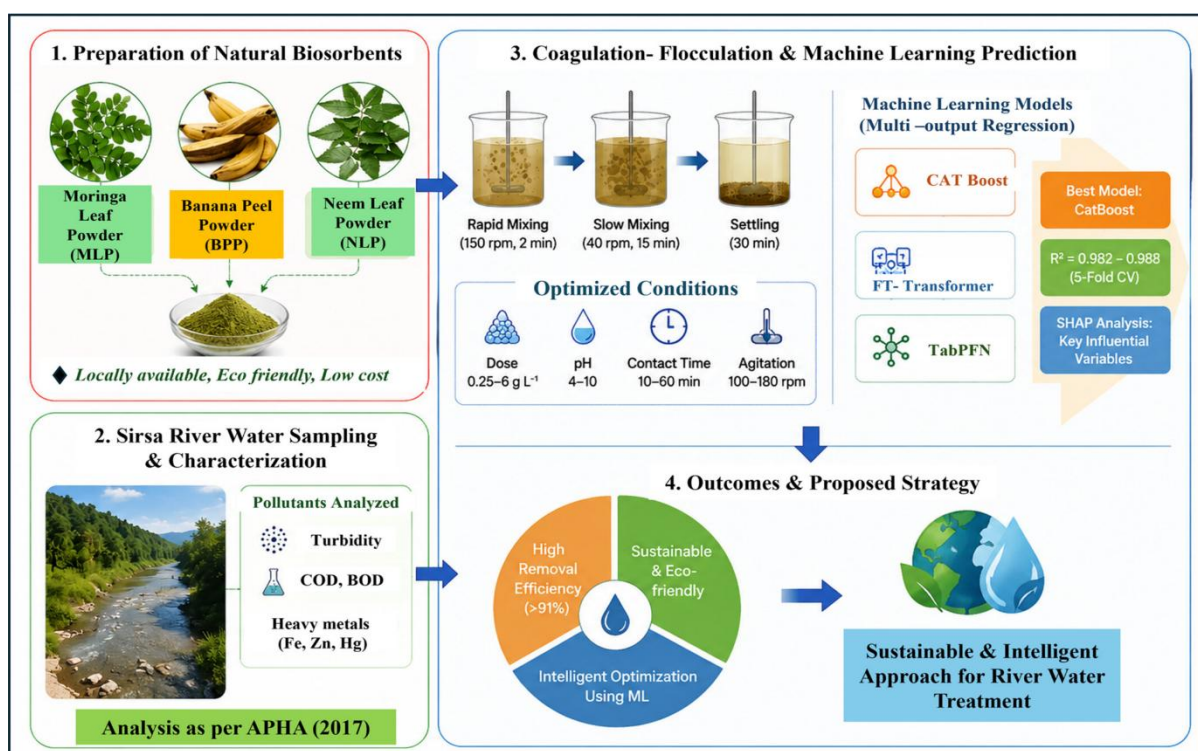
Costa IS, Pereira HMM, Sousa Júnior JR, Monteiro JM. An Acad Bras Cienc. 2026 Sep 14;98(3):e20250157. doi: 10.1590/0001-3765202620250157. eCollection 2026. PMID: 42752519

This study aimed to assess the diversity and composition of species that make up urban forestry and the factors that determine the choice and maintenance of plants by residents of São Francisco do Maranhão. Interviews were conducted in homes or commercial establishments that had trees in front of them, and the species were classified into categories of use. A total of 317 trees from 16 families and 32 species were analyzed; the most abundant individuals were *Azadirachta indica* A. Juss. and *Terminalia catappa* L. When comparing exotic and native individuals, significant differences were identified between them. 201 interviews were conducted, and according to the results, exotic plants filled the utility gaps of native species in almost all categories, except medicinal ones. It was possible to verify the importance of exotic species locally, especially *Azadirachta indica* A. Juss., due to their uses. This species stood out in the community due to the number of individuals found in urban forestry and because it is considered a versatile tree, because in addition to its strong use for shading, it is used in ornamentation and in the treatment of some diseases.

Integrating Plant-Based Coagulation and Explainable Machine Learning for Sustainable River Water Treatment.

Sharma A, Sharma R, Iqbal M, Alotaibi BM. Water Environ Res. 2026 Sep;98(9):e70578. doi: 10.1002/wer.70578.PMID: 42752931

Industrial wastewater discharge has severely degraded freshwater resources, necessitating the development of sustainable and environmentally benign treatment technologies. This study investigates the performance of three plant-based natural coagulants, namely, Moringa leaf powder (MLP), banana peel powder (BPP), and neem leaf powder (NLP), for the treatment of Sirsa River water contaminated with organic pollutants and heavy metals. Coagulation-flocculation experiments were conducted under optimized operating conditions, and treatment efficiency was evaluated based on turbidity, chemical oxygen demand (COD), biological oxygen demand (BOD₅), and the removal of Fe, Zn, and Hg. Among the investigated biosorbents, MLP exhibited the highest treatment performance, achieving removal efficiencies of 85.4% turbidity, 76.2% COD, 73.7% BOD₅, 83.1% Fe, 83.0% Zn, and 81.8% Hg. SEM and FTIR analyses confirmed that hydroxyl, amino, carbonyl, and carboxyl functional groups played a key role in contaminant removal through coagulation-flocculation and surface interactions. To complement the experimental investigation, advanced multi-output machine learning models, including CatBoost, FT-Transformer, and TabPFN, were developed to predict water quality under varying operating conditions. Among the evaluated models, CatBoost demonstrated the highest predictive accuracy, achieving R² values of 0.80-0.86 across the investigated output parameters. SHAP analysis identified biosorbent dosage, solution pH, and contact time as the most influential operational variables governing treatment performance. The integration of experimental biosorption with explainable machine learning provides an effective framework for predicting and optimizing river water treatment processes, highlighting the potential of sustainable plant-based coagulants for intelligent water quality management.



Neem for Human Health

[Ethnopharmacological landscape of *Azadirachta indica* \(Neem\): Phytochemical diversity bridging traditional heritage and modern medicine.](#)

Sharma A, Raut SS, Shukla A, Parul N, Singh A, Mishra A.J Ethnopharmacol. 2026 Dec 6;371:122088. doi: 10.1016/j.jep.2026.122088. Epub 2026 Jun 19.PMID: 42320775

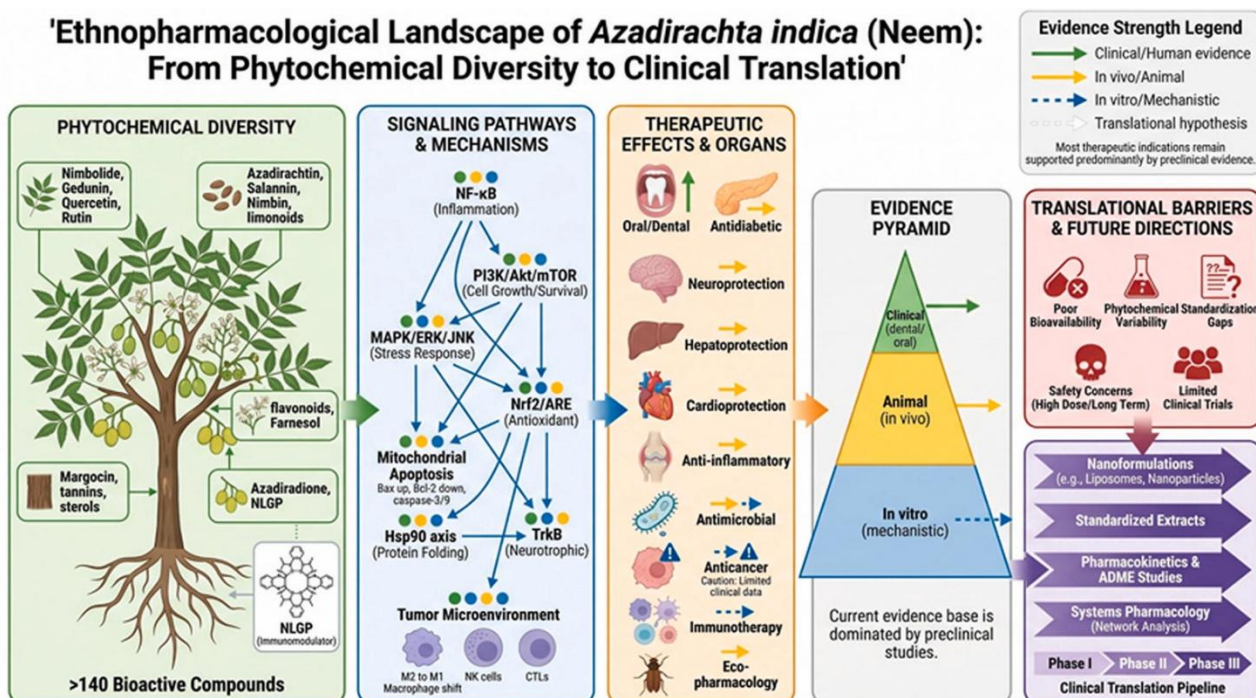
Ethnopharmacological relevance: *Azadirachta indica* A. Juss. (neem) is a cornerstone of traditional medicine across tropical regions, recognized for its broad-spectrum therapeutic applications. However, the translation of its extensive ethnopharmacological legacy into evidence-based therapy is hindered by fragmented reports and a lack of systematic integration.

Aim of the review: This narrative review aims to provide a quantitative and mechanistic synthesis of neem's phytochemical diversity and pharmacological landscape, explicitly distinguishing itself from prior work by mapping over 140 bioactive compounds to specific molecular pathways and clinical potential, while critically evaluating translational barriers.

Methods: A literature search of Web of Science, PubMed, and Scopus was conducted for peer-reviewed articles published between January 2001 and November 2025, using keywords related to *Azadirachta indica*, neem phytochemistry, pharmacology, and toxicology.

Results: Phytochemical investigations have identified over 140 distinct compounds, including limonoids (e.g., azadirachtin, nimbolide, gedunin), flavonoids, and phenolic acids, distributed across all plant parts. These compounds modulate core signaling hubs-NF- κ B, PI3K/Akt/mTOR, Nrf2, and MAPK-underpinning a broad pharmacological spectrum. Preclinical studies suggest that neem-derived compounds exhibit antiproliferative activity against breast, cervical, colon, and prostate cancer cell lines, although in vitro IC₅₀ values alone are not predictive of clinical efficacy. Neem extracts and phytochemicals have also demonstrated neuroprotective effects in experimental models of Alzheimer's and Parkinson's diseases and antidiabetic activity in streptozotocin-induced diabetic rodents; however, the translational relevance of these findings to human disease remains to be established through rigorous clinical investigation. Beyond human health, neem's insecticidal and antifeedant properties support eco-friendly agricultural applications. However, clinical validation remains strikingly limited: only fifteen interventional trials are registered, most for oro-dental conditions, with no published phase II/III results for systemic diseases. Toxicological reports confirm dose- and route-dependent risks, including pediatric encephalopathy from neem oil ingestion and embryotoxicity, necessitating explicit safety guidelines.

Conclusions: Neem possesses validated, multi-target therapeutic potential, yet its clinical translation is currently impeded by poor bioavailability, extract standardization gaps, and a paucity of rigorous human trials. Future research must prioritize pharmacokinetic optimization (e.g., nanoformulations), establishment of certified reference materials, and well-designed phase trials in oncology and metabolic disease, rather than further preclinical cataloging.



[Antimicrobial efficacy of disinfecting solutions against *S. mutans* on toothbrushes for school children in Uttar Pradesh, India.](#)

Singh S, Alok A, Shahnawaz K, Kumar S, Ramdas Naik S, Piyush K. *Bioinformation*. 2026 Jun 30;22(6):3619-3623. doi: 10.6026/973206300223619. eCollection 2026. PMID: 42701787

Toothbrush bristles harbor pathogenic microorganisms like *Streptococcus mutans*, posing a continuous risk for reinfection and dental caries in children. Therefore, it is of interest to evaluate the ability of 5% neem, 5% green tea, 5% turmeric, 0.2% chlorhexidine (CHX) and tap water to disinfect *Streptococcus mutans*-contaminated toothbrushes after 12 hours of soaking. A randomized double-blind crossover study of 40 students (12-15 years) was conducted. All disinfectants significantly reduced bacterial counts compared to baseline, with the greatest reduction observed with 0.2% chlorhexidine, followed by 5% green tea. Thus, data shows that all disinfectants were effective, 0.2% chlorhexidine was the most effective and 5% green tea was a strong herbal alternative.

[Tri-Culture Fermentation of *Neem* \(*Azadirachta indica*\) Leaves Induces Phytochemical Remodeling and Enhances Multi-Target Bioactivities Relevant to Androgenetic Alopecia.](#)

Muangsguan A, Panti N, Ruksiriwanich W, Sawangrat K, Pummara P, Rachtanapun P, Srirangarm K, Sommano SR, Krobthong S, Arjin C, Satsook A, Yingchutrakul Y, Castagnini JM. *Plants* (Basel). 2026 Sep 10;15(18):2779. doi: 10.3390/plants15182779. PMID: 42796811

Androgenetic alopecia (AGA) involves dihydrotestosterone-driven follicular miniaturization compounded by oxidative stress and perifollicular inflammation, while current pharmacotherapies remain limited by adverse effects. *Neem* (*Azadirachta indica* A. Juss., Meliaceae) leaves, a phenolic- and limonoid-rich plant widely used in Southeast Asian traditional medicine, were fermented for seven days with a tri-culture consortium

of *Saccharomyces cerevisiae*, *Lactobacillus plantarum*, and *Aspergillus niger* (TRI-NE) to evaluate whether expanded microbial diversity enhances bioactivity relative to the unfermented extract (UN-NE). TRI-NE significantly increased total phenolic content, rising from 315.30 to 564.70 mg GAE/g by day 7, alongside an overall enhancement of antioxidant capacity across all assays. Moreover, untargeted metabolomics revealed compositional remodeling, with 67.47% of significantly altered metabolite features upregulated after fermentation, including selective enrichment of quercetin despite reductions in other polyphenols. In human hair follicle dermal papilla cells (HFDPCs) and complementary models, TRI-NE consistently outperformed UN-NE, enhancing paracrine-mediated fibroblast proliferation, preserving cell viability under potassium-channel blockade, suppressing lipopolysaccharide-induced inflammatory nitric oxide production, and attenuating oxidative membrane damage. At the transcriptional level, TRI-NE downregulated androgen metabolism (*SRD5A1* and *SRD5A2*) and pro-regression genes (*TGFB1*) while upregulating Wnt/ β -catenin (*CTNNB1*), Sonic Hedgehog (*SHH*, *SMO*, and *GLI1*), and angiogenic (*VEGF*) pathway genes, with effects matching or exceeding standard hair-loss therapeutics. These findings indicate that TRI-NE confers superior bioactivity over the unfermented extract, supporting its potential as a multi-target cosmeceutical candidate for AGA.

[Nimbolide competitively binds to the 14-3-3 epsilon with TFEB to promote lipophagy and ameliorate atherosclerosis.](#)

Qin Y, Zhou Y, Liu C, Zou J, He C. *Phytomedicine*. 2026 Nov;161:158774. doi: 10.1016/j.phymed.2026.158774. Epub 2026 Aug 31. PMID: 42705181

Background: Atherosclerosis, driven by macrophage foam cell formation and lipid accumulation, remains inadequately addressed by current pharmacotherapies, necessitating novel natural therapeutic strategies. Nimbolide (NIM), a limonoid derived from *Azadirachta indica*, possesses established anti-inflammatory properties, yet its efficacy against atherosclerosis and underlying mechanisms remain elusive.

Purpose: The study was designed to assess the impact of NIM on treating atherosclerosis, focusing on cholesterol efflux and lipophagy.

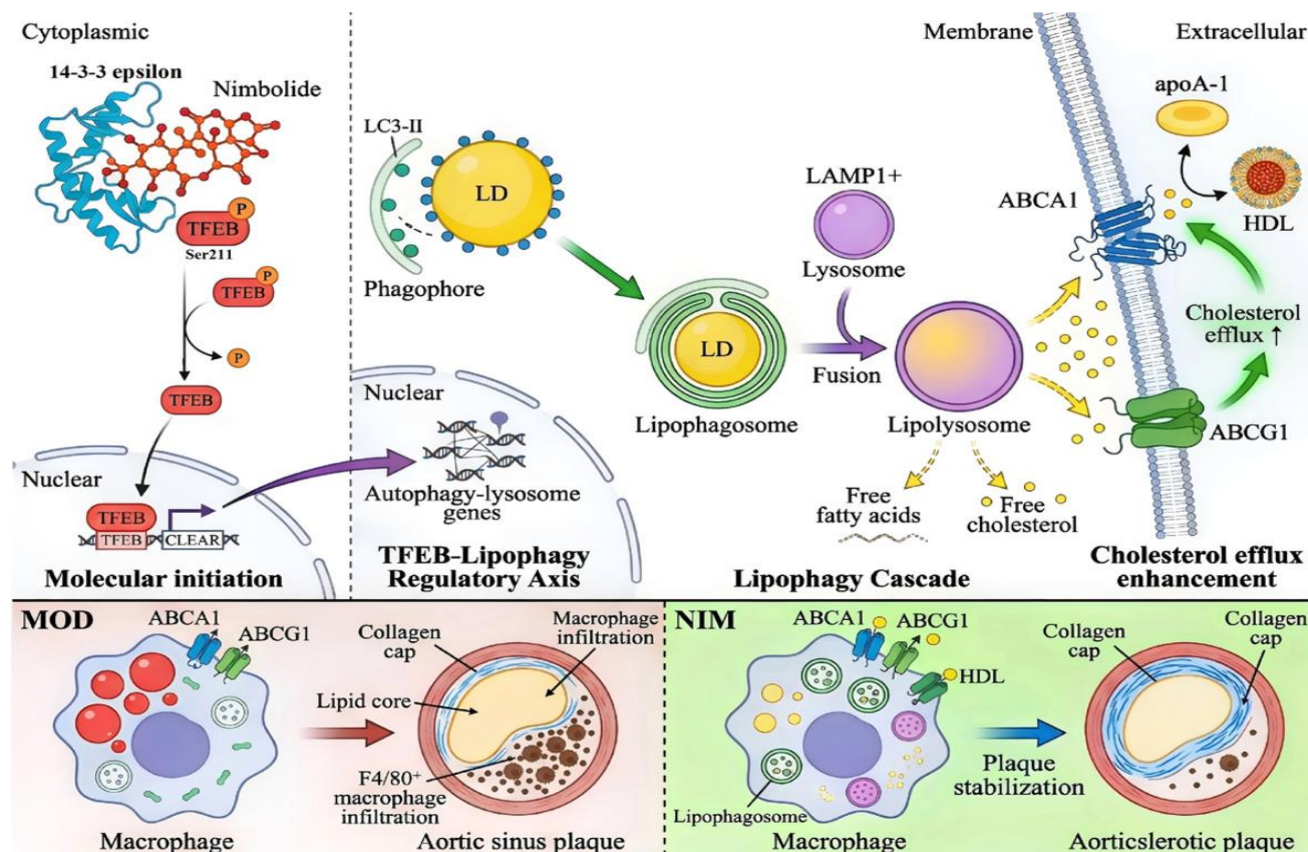
Study design: The study combined both in vivo atherosclerotic mouse modeling and in vitro macrophage foam cell studies.

Methods: Apolipoprotein E-deficient (ApoE^{-/-}) mice fed a high-fat diet received NIM to assess therapeutic effect. Oxidized low-density lipoprotein was used to induce macrophage foam cell formation, and effects of NIM on cholesterol efflux and lipophagy were assessed by western blot, immunofluorescence and electron microscopy. Cellular thermal shift assay (CETSA), surface plasmon resonance (SPR), and co-immunoprecipitation (Co-IP) were employed to investigate molecular interactions. A TFEB-knockdown mouse model was used to evaluate the mediating role of transcription factor EB (TFEB).

Results: NIM administration dose-dependently attenuated aortic plaque burden, improved serum lipid profiles, and reduced vascular inflammation in ApoE^{-/-} mice. In macrophages, NIM enhanced cholesterol efflux via upregulation of ATP-binding cassette transporter A1/G1 and activated lipophagy through TFEB nuclear translocation. Mechanistically, NIM directly bound 14-3-3 epsilon and competitively displaced TFEB, thereby promoting TFEB

dephosphorylation and autophagy-lysosomal activation. TFEB knockdown abolished NIM-mediated lipophagy and atheroprotection both in vitro and in vivo.

Conclusion: NIM exerts anti-atherosclerotic effects by disrupting the 14-3-3 epsilon/TFEB interaction to enhance macrophage cholesterol clearance and lipophagy, identifying this axis as a promising therapeutic target for atherosclerosis.

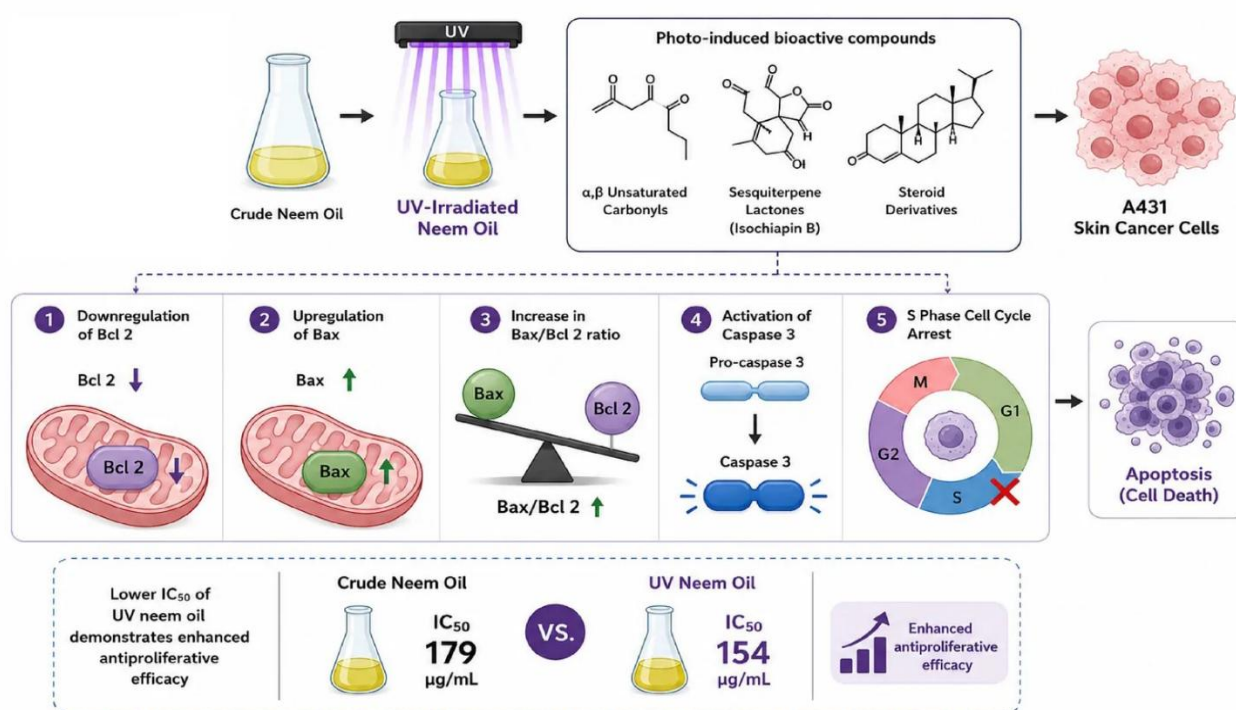


[Mechanistic investigation of UV-irradiated neem oil against microbial biofilms and A431 skin cancer cells via Bax/Bcl2/caspase-3 modulation.](#)

Selim S, Al-Rajhi AMH, Alsalamah SA, Almeyhawawi MS, Alruhaili MH, Gattan HS, Kashmiry AA, Kiki MJ, Ashy RA, Alshareef SA. Bioresour Bioprocess. 2026 Sep 15;13(1):136. doi: 10.1186/s40643-026-01111-7. PMID: 42742888

Neem oil (*Azadirachta indica*) possesses antimicrobial and anticancer properties, but its clinical translation is limited by variable chemical profile and suboptimal bioavailability. Ultraviolet (UV) irradiation is a green, non-thermal physical modification technique that can alter phytochemical composition and bioactivity. The study aimed to characterize chemical changes induced by UV irradiation (254 nm, 120 min) in neem oil and evaluate the enhanced antimicrobial, antibiofilm, and anticancer activities against A431 skin cancer cells, including mechanistic insights into cell cycle arrest and Bax/Bcl-2/caspase-3 signaling. Crude and UV-irradiated neem oils were analyzed by Fourier transform infrared (FTIR) spectroscopy and Gas chromatography-mass spectrometry (GC-MS). Antimicrobial and antibiofilm activities were tested against five pathogens including Methicillin-resistant *Staphylococcus aureus* (MRSA), *Bacillus subtilis*, *Escherichia coli*, *Proteus vulgaris* and *Candida albicans*. Antiproliferative activity against A431 cells was assessed by MTT assay,

cell cycle analysis (flow cytometry), and qRT-PCR for Bcl-2, Bax, and caspase-3. UV irradiation induced oxidation, cis-to-trans isomerization, and formation of α,β -unsaturated carbonyls (FTIR), along with new bioactive compounds: isochiapiin B (3.88%) and a steroid derivative (9.40%) by GC-MS. UV-neem oil significantly enhanced antimicrobial activity (inhibition zones up to 30 mm), reduced MIC/MBC up to eightfold (MRSA, MIC: 125 $\rightarrow$ 15.6 $\mu\text{g/mL}$), and showed superior biofilm inhibition (91-95% at 25% MBC). UV-neem oil exhibited a lower IC_{50} (154.4 vs. 179.3 $\mu\text{g/mL}$), induced stronger S-phase arrest (S-phase reduced to 9.45%), upregulated Bax (5.26-fold) and caspase-3 (7.65-fold), and downregulated Bcl-2 (0.53-fold). UV irradiation transforms neem oil into a more potent antimicrobial, antibiofilm, and pro-apoptotic agent against A431 cells via oxidative and isomeric modifications. This green photochemical approach offers a promising strategy to enhance the therapeutic efficacy of plant oils.



[Investigating the phytochemical composition of *Curcuma longa*, *Azadirachta indica*, and *Asparagus racemosus* using network pharmacology and molecular docking approaches for ovarian cancer therapy.](#)

Santoshi S, Tanwar A, Bahri R, Aggrawal N, Ganjewala D, Bansal H.Z Naturforsch C J Biosci. 2026 Sep 2. doi: 10.1515/znc-2026-0118. Online ahead of print.PMID: 42677485

Given that ovarian cancer is a major health concern for women worldwide, we explored the potential of Indian medicinal plants, namely *Curcuma longa* (Turmeric), *Azadirachta indica* (Neem), and *Asparagus racemosus* (Shatavari) via a combined approach of network pharmacology and molecular docking. Initially, bioactive phytochemicals of these plants were sourced from the IMPPAT and SwissTargetPrediction databases, resulting in the identification of 202 compounds along with 1,124 corresponding protein targets. These were then compared with ovarian cancer-related genes obtained from the GeneCards

database, leading to the identification of 885 common targets. A protein-protein interaction network was constructed and analyzed using Cytoscape to identify the cluster modules. Additionally, gene ontology and pathway enrichment analyses revealed the multifaceted nature of ovarian cancer, indicating its disruptive impact on various cellular processes, signaling pathways, immune responses, and metabolic regulations. Importantly, EGFR, PIK3CA, JAK2, and PIK3CD were identified as crucial therapeutic nodes within the network. Subsequent molecular docking recognized the strong binding affinity between the active compounds and these key targets, thereby supporting the network analysis. In conclusion, the study highlighted the therapeutic action of *C. longa*, *A. indica*, and *A. racemosus* in combating ovarian cancer and promoting the development of plant-based treatments for this cancer.

[Neem leaf glycoprotein mediated immunomodulation and epigenetic regulation in Acute Myeloid Leukemia.](#)

Bibi R, Das S, Deo SS, Sen S, Praveen S, Pujitaa NM, Pradeep R, George M, Sarkar K. Mol Biol Rep. 2026 Sep 3;53(1):1517. doi: 10.1007/s11033-026-12692-z.PMID: 42690245

Background: Acute myeloid leukemia (AML) is associated with impaired antitumor immunity and defective activation of protective immune cells. Neem leaf glycoprotein (NLGP), an immunomodulatory component of neem leaf preparation, has demonstrated antitumor activity in several experimental models without apparent toxicity. This study investigated the immunomodulatory and epigenetic effects of NLGP on immune cells involved in tumor protection in AML.

Methods: Peripheral immune cells from healthy individuals and AML patients were treated with NLGP. CD33 negative lymphocytes from AML patients were evaluated for lymphocyte proliferation, immune-cell activation, and secretion of the Th1-associated cytokines IFN- γ and TNF- α . Nitric oxide (NO₂⁻) release and reduced glutathione (GSH) content were also measured. The expression of Th1- and tumor-suppression-associated genes was analyzed. Chromatin immunoprecipitation was used to assess enrichment of active histone marks, including H3K4me3 and H3K14Ac, and repressive or regulatory markers, including H3K27me3, HDAC1, p53, Notch1, and c-Myc, at the IFNG and TBX21 loci. Cytotoxic T-lymphocyte (CTL)-mediated killing of AML cells was also examined.

Results: NLGP enhanced lymphocyte proliferation and activated multiple immune-cell populations in normal subjects and AML-derived CD33 negative lymphocytes. It increased IFN- γ , TNF- α , and NO₂⁻ production while reducing GSH content. NLGP upregulated genes associated with Th1 immunity and tumor suppression. At the IFNG and TBX21 loci, it increased enrichment of H3K4me3, H3K14Ac, and p53, while reducing H3K27me3, HDAC1, Notch1, and c-Myc enrichment. NLGP also stimulated CTLs and enhanced their ability to eliminate AML cells.

Conclusion: NLGP promotes tumor-protective immunity in AML through coordinated immune activation and epigenetic regulation, supporting its potential as a novel adjunctive immunotherapeutic strategy.