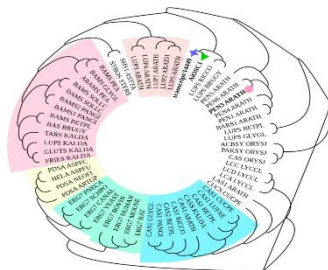


Neem Research Newsletter

Volume 5, Issue 3, 2025



WORLD NEEM ORGANISATION (WNO)



From

The Editor's Desk.....

It is heartening to note burgeoning activity in neem research this time with a large number of papers published in the agricultural front. Neem nanoparticles treatment was shown as an eco-friendly and safe alternative to preserve fruit quality, reducing post-harvest disease/losses and extending the shelf life of mango by delayed the ripening process. Neem oil and rhamnolipid biosurfactant used as the base oil and surfactant for the formulation of a stable green oil-in-water nanoemulsion for pesticide application facilitated faster spreading, enhancing wettability and efficacy. A combination of Bee Vectoring Technology (BVT) using bumblebees and a direct spray application of neem reduced the severity of barley yellow dwarf disease in oat fields. Validated IPM strategies that use neem seed kernel extract spray has been advocated for Kinnow mandarin growing farmers as an economically viable option for the management of psylla, whitefly, sooty mould, and dieback pests. Co-assembled nanoparticles based on azadirachtin and tannic acid or phenylalanine were demonstrated to be eco-friendly water-based biopesticide treatment method with improved physicochemical properties and utilization efficiency. Using aided-virtual screening and molecular dynamics simulation approach, azadirachtin was identified as a useful biopesticide for mitigating the impact of blast disease on cereal crops. Hydrophobic ethanol-solvated curcumin and azadirachtin biomolecules zipped in zein was shown to be an innovative seed invigoration technique for prolonging the storability of black gram seeds. Azamax™ was shown to have detrimental effects on the lifespan and ovarian development of *C. claveri*, a non-target pest predator, raising concerns on adverse effects of biopesticides. Neem phytochemicals were found to offer promise in combating the white spot syndrome virus (WSSV), that impacts global shrimp industry.

Improved genome assemblies were undertaken to provide insights into allopatric speciation of neem, as well as limonoid biosynthesis and chemical diversity in meliaceae plants. Neem gum-poly(acrylic acid) based adsorbent was shown to be a promising candidate for dye effluent adsorption. A study in Nigeria showed that neem tree posed no significant radiological health risk when used in construction. Neem and turmeric extracts were found to be effective in the green synthesis of silver nanoparticles, which exhibited notable antimicrobial activity. Graphene oxide-based nanocarriers integrated into a neem oil double emulsion and coated with polylactic-co-glycolic acid/alginate (PLGA-Alg) hydrogel delivered hesperidin with sustained release and enhanced antibacterial, antifungal, and antioxidant properties and may be used to treat ear inflammation. The efficacy of neem-chitosan composites as antibacterial agents was demonstrated. Neem exerted immunomodulatory effects and suppressed B-cell populations. Polyherbal facewash gels containing neem as a constituent exhibited potent anti-acne effects. The medicinal plants of Izki, Oman including neem were shown to have significant ethnopharmacological relevance, exhibiting pharmacological properties, making them crucial for traditional and modern therapeutic applications. Using network pharmacology approach bioactive compounds from neem that could target Dengue virus capsid protein were identified. Scientists have shown the cardioprotective properties of peptide fractions from neem seed protein hydrolysates. Neem oil extract also displayed antidiabetic properties. Nanocomposites synthesized using neem leaf extracts were found to hold great promise for dermal applications.

S. Nagini

Core Founding Member, WNO
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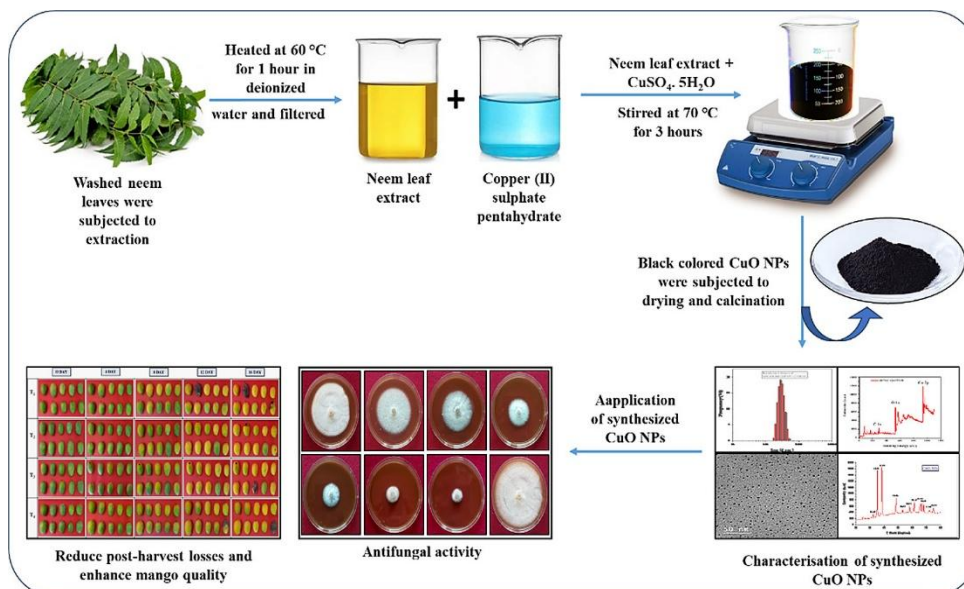


Neem in Agriculture & Aquaculture

[Azadirachta indica derived copper oxide nanoparticles: A sustainable approach for reducing post-harvest losses and enhancing mango quality.](#)

Joshi RL, Sharma H, Mehta VN, Patel SK, Bambharoliya K. Food Chem. 2025 Feb 27;480:143625. doi: 10.1016/j.foodchem.2025.143625. Online ahead of print. PMID: 40121879

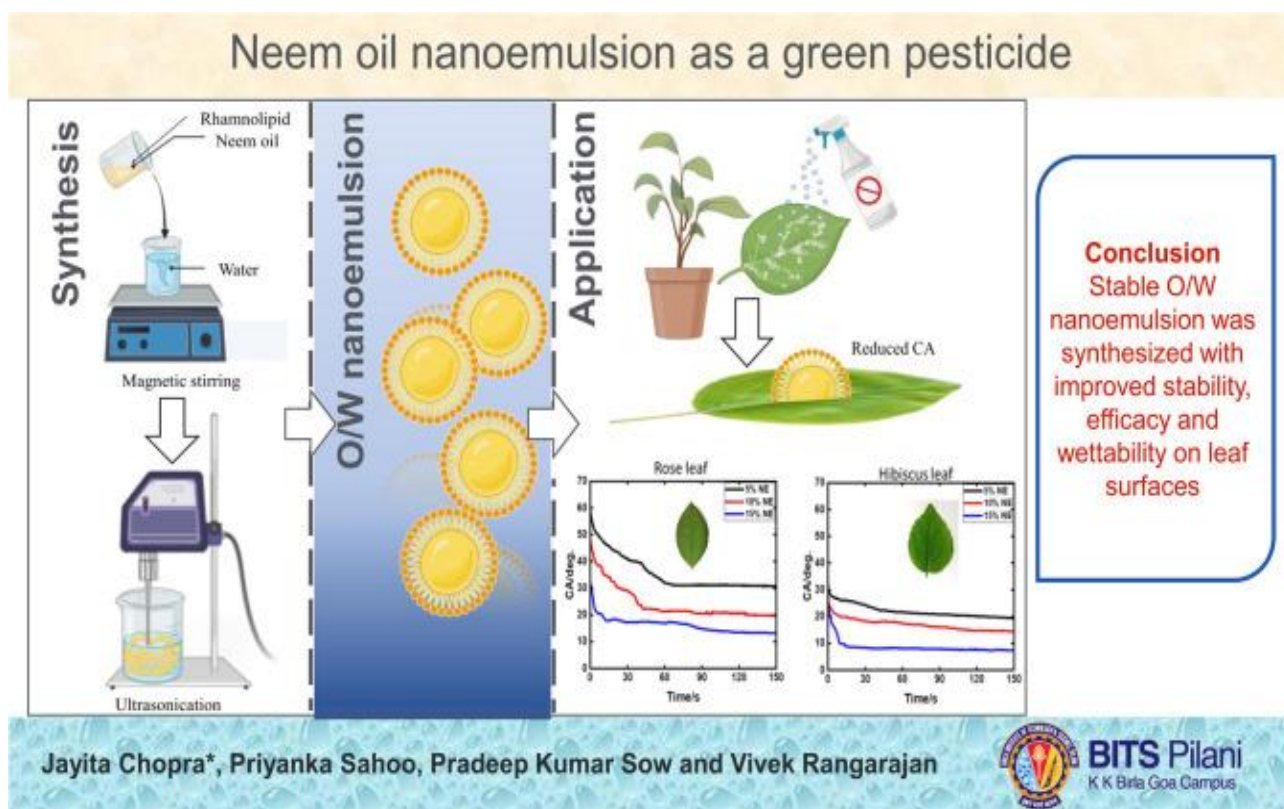
In this study, the green synthesis of copper oxide nanoparticles (CuO NPs) mediated by *Azadirachta indica* is reported, along with an evaluation of their antifungal activity against post-harvest anthracnose and their effects on the storage behaviour (shelf life) and physico-chemical properties of 'Kesar' mangoes, particularly those associated with the ripening process. The CuO NPs were initially synthesized using neem leaf extract and characterized through UV-Visible spectroscopy, SEM, EDX, HR-TEM, FT-IR, XRD, XPS, DLS and zeta potential. Characterization confirmed their monoclinic crystalline structure, spherical morphology, high purity, and stability, with a mean size of 50.93 nm and a zeta potential of -32.50 mV. The antifungal activities of synthesized CuO NPs against the fungus *Colletotrichum gloeosporioides* were assessed using poisoned food technique in which 1000 ppm CuO NPs showed lowest colony diameter (20.70 mm) and highest per cent growth inhibition (77.00 %). Subsequently in a dipping treatment lowest per cent disease incidence (00.00 %) were recorded in fruit treated with CuO NPs @ 200 ppm and 250 ppm, respectively. While, highest shelf life (18.23 days) were recorded in fruit treated with CuO NPs @ 250 ppm. Untreated control fruit exhibited increased per cent weight loss, total sugar, reducing sugar, non-reducing sugar and total soluble solids (TSS) over the storage period which responsible for early and rapid ripening. Post-harvest treatments of CuO NPs improved mango quality by reducing weight loss, retaining firmness, and delaying ripening through maintaining peel thickness, lower sugar levels, and higher titratable acidity and ascorbic acid. The 250 ppm concentration was most effective, ensuring safety with copper levels below toxicity thresholds. Therefore, *A. indica*-CuO NPs treatment is an eco-friendly and safe alternative to preserve fruit quality, reducing post-harvest disease/losses and extending the storage period (shelf life) of mango by delayed the ripening process.



[Investigating the wettability of neem oil nanoemulsion as a green pesticide on leaf surfaces - optimizing formulation, assessing stability, and enhancing wettability.](#)

Chopra J, Sahoo P, Sow PK, Rangarajan V. RSC Adv. 2025 Mar 20;15(11):8645-8656. doi: 10.1039/d5ra00556f. eCollection 2025 Mar 17. PMID: 40114719

The present study focuses on formulating a stable green oil-in-water nanoemulsion (NE) formulation for pesticide application, thereby addressing the primary challenges of botanical pesticides by improving the stability, efficacy, and wettability of leaf surfaces. Neem oil and rhamnolipid biosurfactant were utilized as the base oil and surfactant, respectively for the NE formulation. Initial screening studies with varying oil-to-surfactant ratios identified an optimal ratio of 7.13 (w/w), corresponding to 15% oil (v/v) of total emulsion volume, for a stable NE. The stability of the formulation was validated in a 25 mL volume over 20 days, maintaining a mean droplet diameter of 139.1 ± 7.34 nm and a polydispersity index of 0.207. Further stability assessments under varying time, temperature, ionic strengths, and centrifugal forces revealed a relatively stable droplet diameter ranging from 141 to 245 nm. The surface tension for the optimal formulation was measured to be 35.7 ± 0.4 mN m⁻¹. Additionally, experiments with various NE formulations on selected leaves showed that NEs with higher oil content displayed faster spreading, as indicated by a rapid reduction in contact angle. The novelty of the study lies in demonstrating the synergistic interaction between oil and rhamnolipid, which facilitated faster spreading compared to the individual spreading of either component, as revealed by the dynamic spreading studies of the NE formulation on leaf surfaces. Therefore, this research paves the way for future research and development of green pesticides that are sustainable and effective compared to their chemical counterparts.



[Sustainable control of the bird cherry-oat aphid \(*Rhopalosiphum padi* L.\) in northwestern Ontario using *Beauveria bassiana* delivered by bumblebees.](#)

Kapongo JP, Kotomale MLC, Lubusu AMB, Simo Nana R, Fopie Tokam DR, Mboussou GSN. Front Insect Sci. 2025 Feb 19;5:1468262. doi: 10.3389/finsc.2025.1468262. eCollection 2025. PMID: 40046651

Rhopalosiphum padi is one of the main vectors of barley yellow dwarf virus (BYDV), which affects the grain yield of oats. Several biological control strategies have been studied to control this pest, one of which is Bee Vectoring Technology (BVT) using bumblebees. We tested the efficacy of *Beauveria bassiana*, as vectored by bumblebees, and a direct spray application of neem (a natural bio-insecticide derived from the *Azadirachta indica* tree) on aphids. An assessment of the pest's impact on the plots surveyed in northwestern Ontario revealed incidence rates of 80%. The use of bumblebees as a dispersal agent of *B. bassiana* significantly reduced the aphid population ($0.542 \pm 0.147b$) compared to the untreated control ($0.125 \pm 0.069a$). The application of diluted neem also showed a reduction in the aphid population ($0.708 \pm 0.221a$). Although the products used controlled the pests, they had no effect on the aphid's natural enemy, the ladybug. Therefore, the dissemination of *B. bassiana* by the bumblebee *Bombus impatiens* leads to a decrease in the vector *Rhopalosiphum padi* population and consequently reduces the severity of barley yellow dwarf disease in oat fields.

[Integrated Pest Management techniques in a Kinnow mandarin \(*Citrus reticulata* Blanco\) orchard with an emphasis on yield improvement.](#)

Meena PN, Raghavendra D, Singh S, Kumar N, Khokhar MK, Chander S, Lal MK, Tiwari RK, Kumar R. Heliyon. 2025 Feb 8;11(4):e42574. doi: 10.1016/j.heliyon.2025.e42574. eCollection 2025 Feb 28. PMID: 40028591

Kinnow mandarin (*Citrus reticulata* Blanco) is a valuable fruit crop mainly grown in the North Indian states of India due to its high-quality juice content. Psylla (*Diaphorina citri* Kuwayama), whitefly (*Diuraphis citri* Ashmead), sooty mould (*Capnodium citri*) and dieback (*Colletotrichum gloeosporioides*) pests are the most important biotic constraints affecting its fruit yield up to 70 percent. To manage these pests, farmers often use mixture of non-label claim pesticides (quinalphos 25%EC, lambda-cyhalothrin 2.5%EC, diafenthiuron 50%WP, chlorantraniliprole 18.5 %, cymoxanil 8 % + mancozeb 64 % WP, etc.) without achieving the desired effect. Hence, area-wide implementation of the Integrated Pest Management (IPM) strategy in Kinnow mandarin was implemented during 2021-2023 covering 5 villages at Hisar, Haryana. Among the IPM strategy, installing yellow sticky traps @ 20/ha, neem seed kernel extract spray @ 5 %, and imidacloprid 17.8SL @ 0.3 % reduced the whitefly and psylla populations. The spray of 1 % starch and dipping infected fruits in a bleaching solution @ 0.1 % reduced the severity of sooty mould disease. Pruning and destruction of dead twigs followed by a spray of copper oxychloride 50 WP @ 0.3 % were found very effective too. The lowest average population of psylla and whitefly were recorded in T₁-IPM compared to T₂-farmer practice and T₃-control, respectively. Minimum average disease severity of sooty mould and dieback was noticed in T₁-IPM compared to T₂-farmer practice while the highest disease severity was recorded

in T₃-control. Population dynamics of psylla, whitefly and sooty mould, dieback severity, and Area Under Diseases Progress Curve (AUDPC) were found to vary during 11th to 52nd standard meteorological week (SMW). They were observed to be highest in T₃-control treatment, followed by T₂-farmer practice and T₁-IPM. The highest natural enemy's populations (Coccinellid, *Chrysoperla*, and spider) were recorded in T₃-control followed by T₁-IPM, and then in T₂-farmer practice treatment. The highest average fruit yield and B: C ratio was recorded in T₁-IPM compared to T₂-farmer practice and T₃-control treatment. The validated IPM strategies can be adopted by Kinnow mandarin growing farmers as an economically viable option for the management of psylla, whitefly, sooty mould, and dieback pests.

[Deciphering the intricacies of chlorantraniliprole, azadirachtin and uniconazole interactions with fall armyworm in maize: a comprehensive analysis through transcriptomic and metabolomic profiling.](#)

Basit A, Mobarak SH, Khurshid A, Hu CX, Smagghe G, Gui SH, Liu TX. Pest Manag Sci. 2025 Mar 14. doi: 10.1002/ps.8770. Online ahead of print. PMID: 40084608

Background: Maize is a critically important world staple food, yet its productivity is exposed to a notorious invasive pest of the fall armyworm (*Spodoptera frugiperda*). To discern the transgenerational effects and potential pest control efficacy, we evaluated chlorantraniliprole, azadirachtin, and uniconazole on *S. frugiperda* development, reproduction, metabolome, and larval transcriptome.

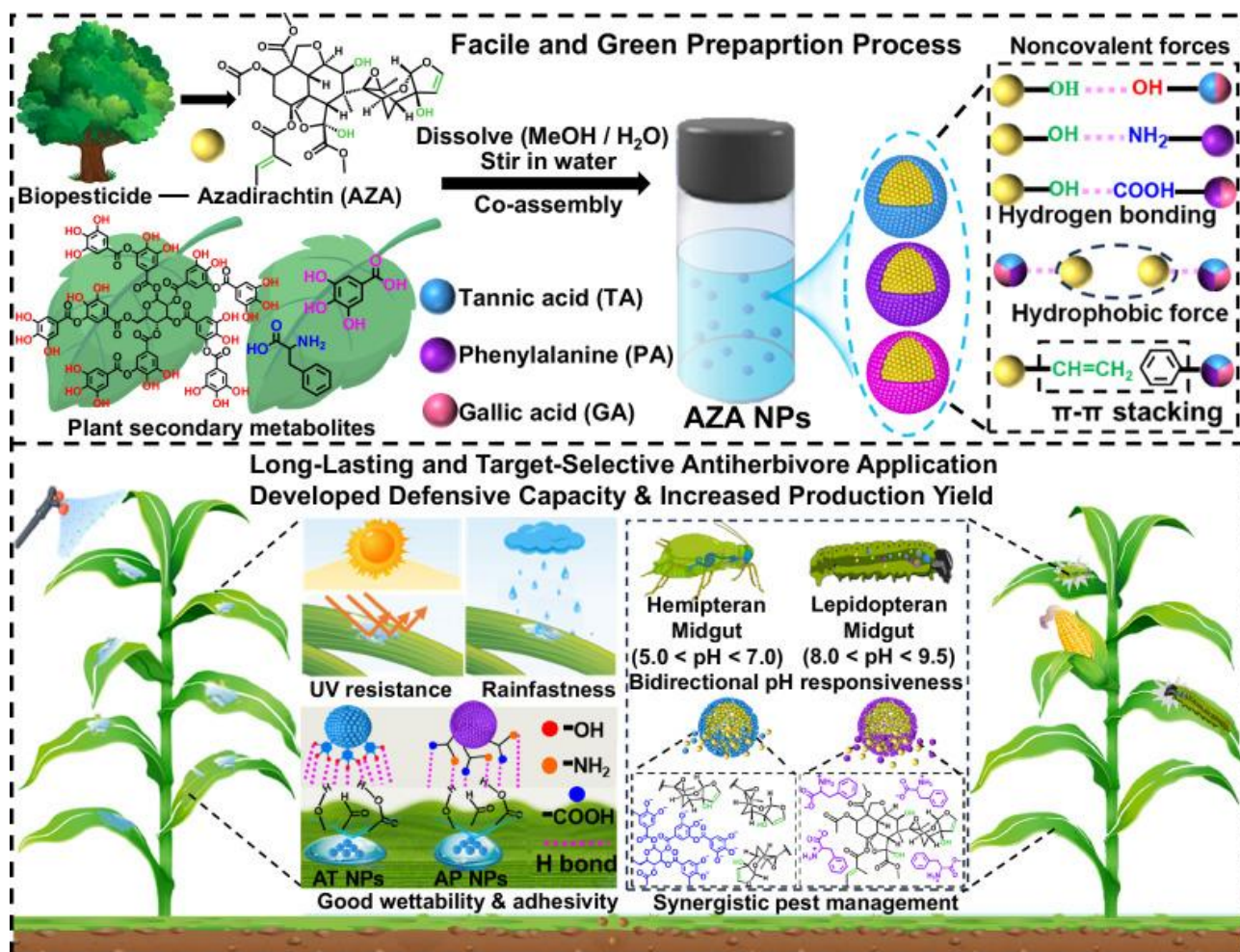
Results: Exposure to chlorantraniliprole, azadirachtin, and uniconazole has impacted *S. frugiperda* larval development, pupation, fecundity, and longevity. Biochemical analysis of the specific enzyme activities [acetylcholinesterase (AChE), carboxylesterase (CarE), glutathione-S-transferase (GST), and cytochrome P450 (P450)] showed a very high magnitude of activity changes. Chlorantraniliprole and azadirachtin had prominent influences on the expression of common genes involved in DNA replication, oxidative phosphorylation, digestion, immune reaction, and the endocrine system, as shown by RNA sequencing. In contrast, uniconazole affected gene regulation only marginally. Besides, the pesticides significantly affected the maize plants by altering their metabolome and transcriptome profiles and dramatically enhanced plant mortality, especially after chlorantraniliprole and azadirachtin treatments. RNA sequencing of maize plants treated with chlorantraniliprole, azadirachtin, and uniconazole revealed significant gene expression changes, providing insights into the plant's adaptive responses and potential alterations in insect-plant interactions.

Conclusion: These results indicate complex, transgenerational effects of *S. frugiperda* itself and maize plants. These findings underline the potential of integrating these compounds into bio-intensive pest management strategies against *S. frugiperda*, with implications for enhancing maize protection.

Sustainable pest management using plant secondary metabolites regulated azadirachtin nano-assemblies.

Zhang X, Xiao J, Huang Y, Liu Y, Hu G, Yan W, Yan G, Guo Q, Shi J, Han R, Li J, Tang G, Cao Y. Nat Commun. 2025 Feb 18;16(1):1721. doi: 10.1038/s41467-025-57028-w. PMID: 39966497

Biopesticides have emerged as a global trend to minimize the risks associated with synthetic agrochemicals. However, their stability and efficacies remain challenges for widespread application. Herein, co-assembled nanoparticles (AT NPs or AP NPs) based on azadirachtin (AZA) and tannic acid (TA) or phenylalanine (PA) are constructed in aqueous solution through self-assembly technology. The small particle size, low PDI, high ζ -potential, and related other physicochemical characteristics of nanoparticles can improve wettability, adhesiveness, rain erosion resistance, and photostability compared to the commercial AZA formulation. Importantly, co-assemblies with bidirectional pH-responsive disassembly in acidic or alkaline solutions, allow them to respond to microenvironmental stimuli of targets and enable controlled release of AZA. The nanosystems demonstrated remarkable in vitro and in vivo insecticidal activities against *Ostrinia furnacalis* and *Aphis gossypii*. This study illustrates a distinctive perspective for developing eco-friendly nanosystems, highlighting a water-based treatment method for biopesticides with improved physicochemical properties and utilization efficiency.



[Identification of potent phytochemicals against *Magnaporthe oryzae* through machine learning aided-virtual screening and molecular dynamics simulation approach.](#)

Murmu S, Aravinthkumar A, Singh MK, Sharma S, Das R, Jha GK, Prakash G, Rana VS, Kaushik P, Farooqi MS. *Comput Biol Med.* 2025 Apr;188:109862. doi: 10.1016/j.combiomed.2025.109862. Epub 2025 Feb 17. PMID: 39965394

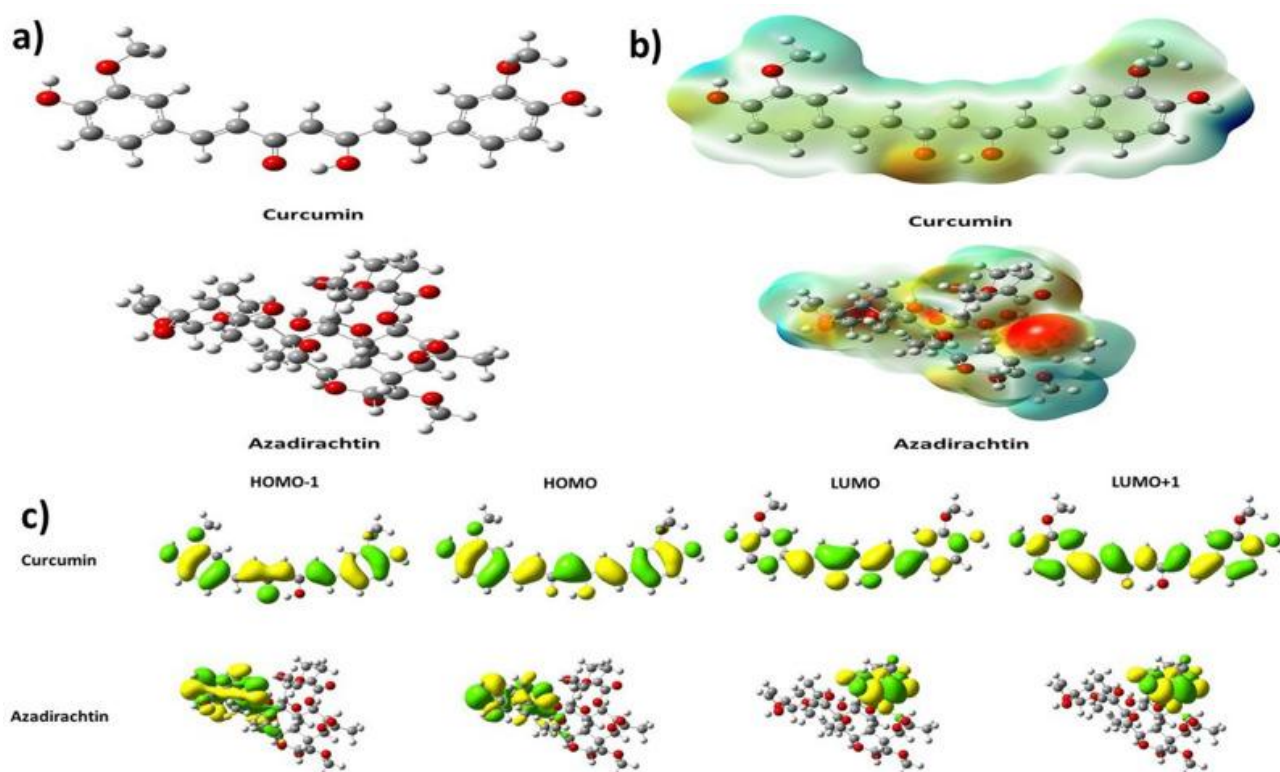
Magnaporthe oryzae stands as a notorious fungal pathogen responsible for causing devastating blast disease in cereals, leading to substantial reductions in grain production. Despite the usage of chemical fungicides to combat the pathogen, their effectiveness remains limited in controlling blast disease. Consequently, there exists a pressing need to discover a novel natural biofungicide for efficient blast disease management. To address this challenge, we combined machine learning-based bioactivity prediction with virtual screening, molecular docking, and molecular dynamics (MD) simulations to explore the molecular interactions between forty-eight plant-derived natural compounds and the effector protein, Avr-PikE, an avirulence protein from *Magnaporthe oryzae*. Among the evaluated phytochemicals, Calotropin, Lupeol, and Azadirachtin emerged as the top-ranking molecules based on their favourable affinity through molecular docking with the effector. MD simulations for 100 ns were conducted to ascertain the stability and reliability of these compounds. Through classical and steered MD simulations and free energy calculations, it was revealed that these selected compounds exhibit stable and favourable energies, thereby establishing strong binding interactions with Avr-PikE. These screened natural metabolites were also found to meet crucial criteria for fungicide-likeness. To support accessibility and broader applications, we also developed a bioactivity prediction app (<http://login1.cabgrid.res.in:5260/>), allowing users to predict bioactivity against fungi based on our model. The efficacy of one potent compound, Lupeol, was validated through in vitro experiments, confirming its significant antifungal activity against *Magnaporthe oryzae*. Such biofungicides hold promise for enhancing disease management strategies and mitigating the impact of blast disease on cereal crops.

[Eco-friendly nano colloids for enhanced black gram \(*Vigna mungo*\) seed viability: experimental and computational analysis.](#)

Madhan K, Kalimuthu R, Antony D, Chidambaram P, Sekar A, Solomon RV, Yadav R, Kasivelu G, Ramakrishna S. *BMC Plant Biol.* 2025 Feb 15;25(1):204. doi: 10.1186/s12870-024-05888-7. PMID: 39955488

An experiment was designed to fabricate Polyvinylpyrrolidone-coated zein-zipped herbal molecules infused nano colloids (PZCA-NCs) for extending *Vigna mungo* seeds storability. PZCA-NCs was synthesized and characterized in Fourier Transform Infrared Spectroscopy (FTIR), X-Ray diffraction (XRD), Particle size analyser, Zeta Potential, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), and Energy-dispersive X-ray spectroscopy (EDAX). The bio-efficacy of PZCA-NCs on seed storability was tested under accelerated ageing. The sphere-shaped PZCA-NCs possess a 151 nm size with 44.5mV zeta potential at an encapsulation of 73.44% curcumin and 69.0% azadirachtin. The spectra of FTIR, UV -Vis, XRD, and TGA confirmed the functionality, composition, and stability of PZCA-NCs. The dialysis diffusion method was

utilised to study the maximum cumulative release of biomolecules 6.1ppm (88.4%) azadirachtin and 64.57ppm (88.2%) curcumin at pH 7.4. Density functional theory (DFT) was used to determine the binding mode of molecules and examine ligand interactions in PZCA-NCs. PZCA-NCs treated seeds at 25 mL/kg enumerated higher germination, vigour index, α -amylase, dehydrogenase, and catalase and peroxidase activity under ageing. Seeds storage pathogen infection was reduced with an increase in the concentration of PZCA-NCs coating. The bioassay results on insect activity evidenced that PZCA-NCs at 15.76 mL/kg killed 50% and 40 mL/kg killed 100% of the storage insect *Callosobruchus maculatus*. Toxicity study on *Macrophomina phaseolina* showed that PZCA-NCs at 35 mL resulted in 0.8 cm mycelia growth with 91.11% inhibition zone, while at 45 mL had zero growth of fungal mycelia with 100% inhibition. The study concludes that PZCA-NCs act as an efficient seed invigoration material to extend the vitality of *Vigna mungo* seeds during ageing.

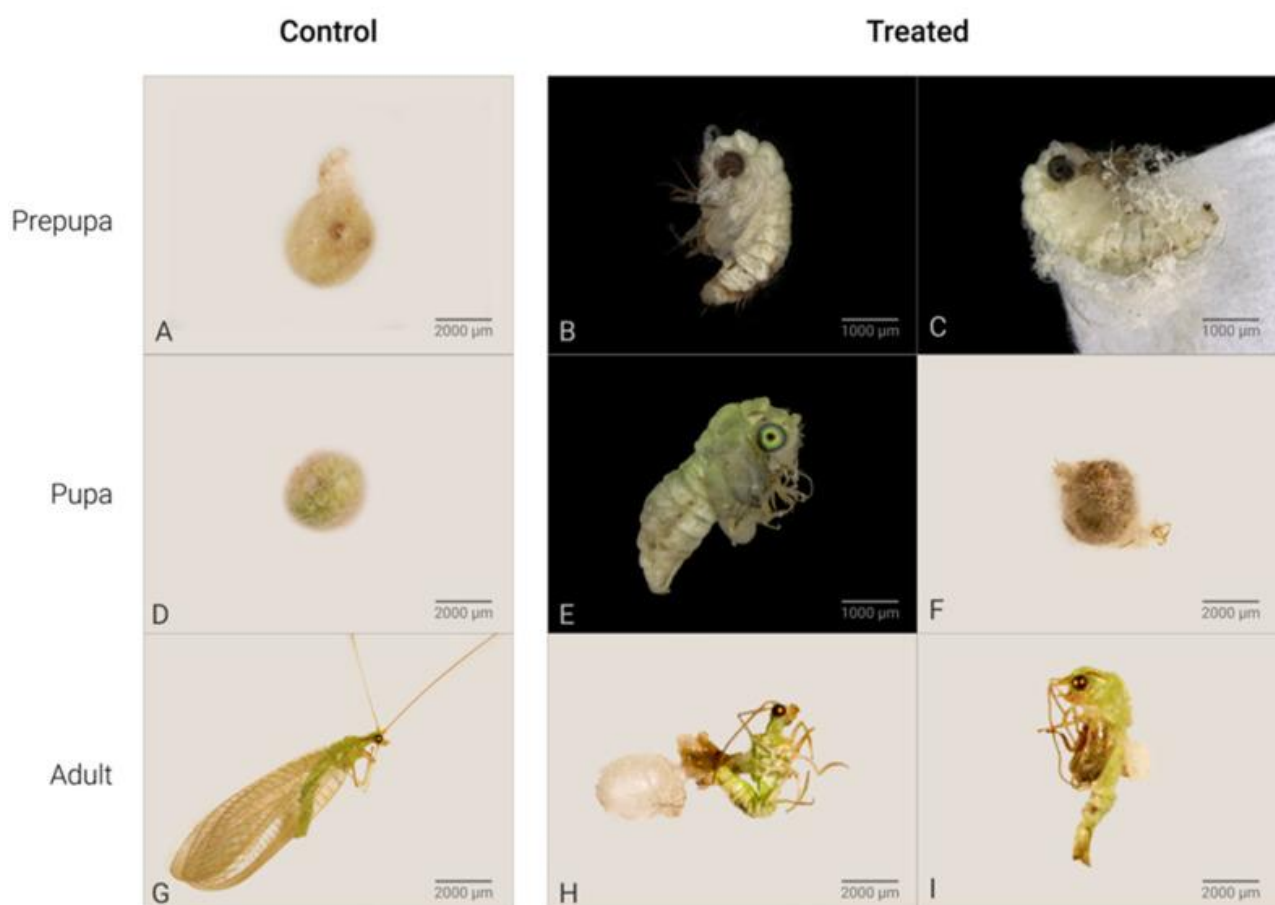


[Azadirachtin-Based Biopesticide Affects Fitness and Ovarian Development of the Natural Enemy *Ceraeochrysa claveri* \(Neuroptera: Chrysopidae\).](#)

Gastelbondo-Pastrana B, Santorum M, Scudeler EL, Fernandes FH, Alvis EM, Chams-Chams L, Dos Santos DC. *Plants (Basel)*. 2025 Jan 31;14(3):416. doi: 10.3390/plants14030416. PMID: 39942978

Plant-derived biopesticides have gained attention in agriculture as a pest control method that minimizes the negative effects caused by conventional synthetic insecticides to natural enemies. Azamax™ is one of the most commercialized biopesticides in Brazil, but little is known about its effects on non-target insects such as *Ceraeochrysa claveri*, a non-target insect that is economically important as a pest predator, used in this study. To evaluate the toxic effects of azadirachtin on fitness and ovarian development, a total of

450 *C. claveri* larvae were exposed by ingestion to subdoses (36 mg/L (0.3%) and 60 mg/L (0.5%)) of azadirachtin for 15 days and after that, biological parameters and ovarian development were analyzed. The doses tested corresponded to the minimum and maximum concentrations used in the field. The results demonstrated that both tested doses of the biopesticide significantly reduced survival rates, delayed and extended larval and pupal development times, caused malformations in the body, altered the ultrastructure of adult ovaries, and induced cell death in ovarian follicles. Azamax™, a biopesticide marketed as a reduced-risk insecticide, was shown to have detrimental effects on the lifespan and ovarian development of *C. claveri*.

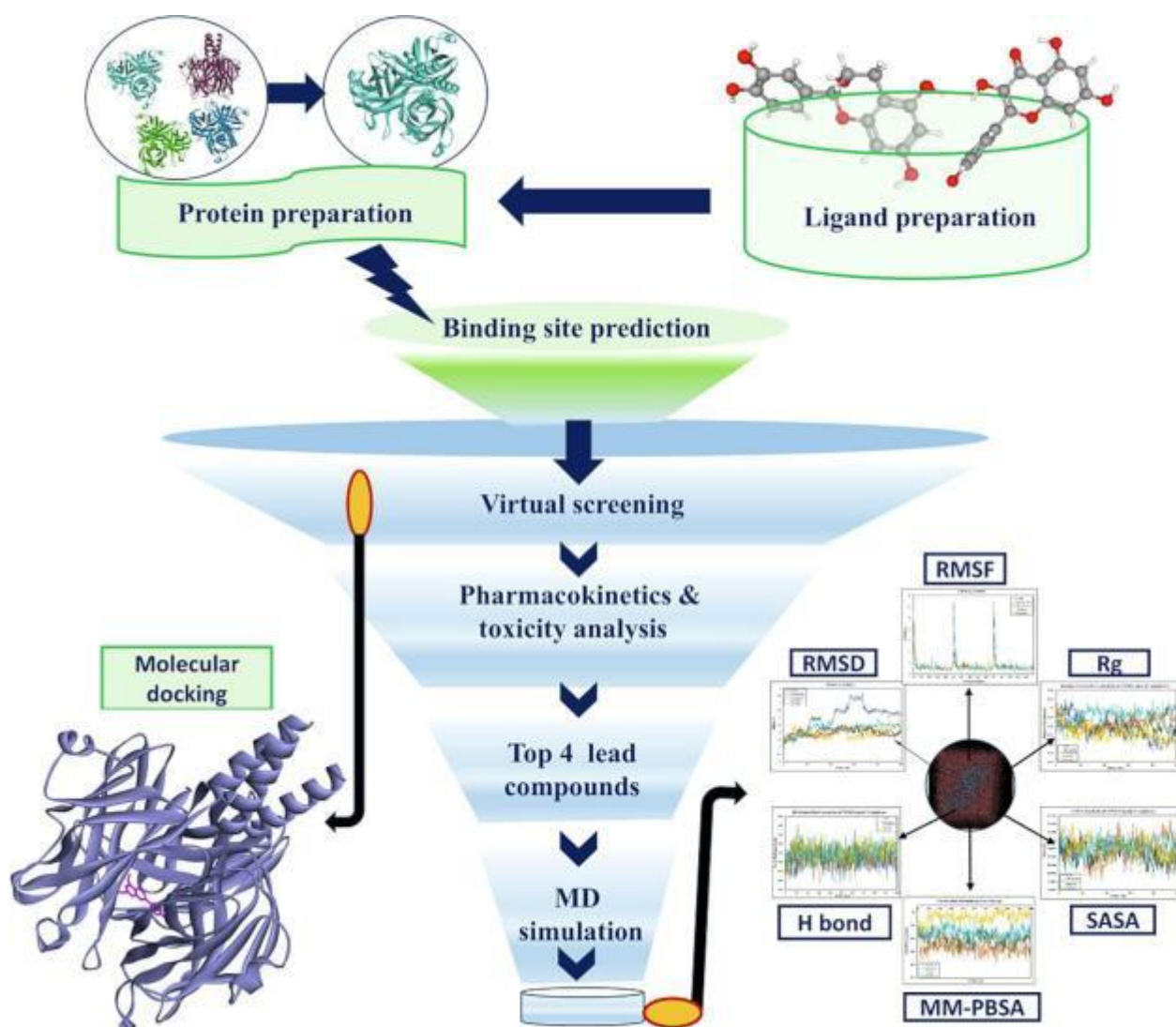


[High-throughput screening of natural antiviral drug candidates against white spot syndrome virus targeting VP28 in Penaeus monodon: Computational drug design approaches.](#)

Tahamid Tusar MT, Hossen Z, Gazi HR, Haq N, Jubayer AA, Islam MM, Lisa AK, Sikdar B, Haque ME.J Genet Eng Biotechnol. 2025 Mar;23(1):100455. doi: 10.1016/j.jgeb.2024.100455. Epub 2024 Dec 28.PMID: 40074429

The white spot syndrome virus (WSSV), considered the deadliest pathogen impacting Penaeid shrimp (*Penaeus monodon*), remains worrisome for the global shrimp industry due to its extreme virulence and mortality rate of up to 100%. To date, there has been no breakthrough in effective antivirals or vaccines that can mitigate the financial damage caused by the pathogen. The distinctive structure of VP28 facilitates its role as a trimer,

serving as the primary envelope protein of WSSV. It anchors to the viral envelope, directly interacts with PmRab7, a membrane protein in *P. monodon*, and aids in entry into the host. This research aims to discover antiviral drug candidates targeting VP28 trimer by screening a virtual library of 187 bioactive compounds derived from the medicinal herbs *Azadirachta indica* and *Bacopa monnieri*. To evaluate the drug ability of compounds in restricting VP28 trimer interaction within the endocytic pathway, a computational strategy was employed, including virtual screening, pharmacokinetics and toxicity analysis, and molecular dynamics (MD) simulation. The four strongest compounds, epicatechin, luteolin, kaempferol, and apigenin, exhibited binding affinities of -8.8, -8.8, -8.7, and -8.5 Kcal/mol, respectively, and demonstrated excellent pharmacokinetic properties. Furthermore, we employed 100 nanoseconds MD simulations and MM-PBSA binding free energy calculations to examine intermolecular interactions and confirmed the structural stability of the compounds at the VP28 binding site. The findings of this research suggest that these compounds hold promise in combating WSSV infection, reducing economic losses, and contributing to the sustainability of the shrimp industry.

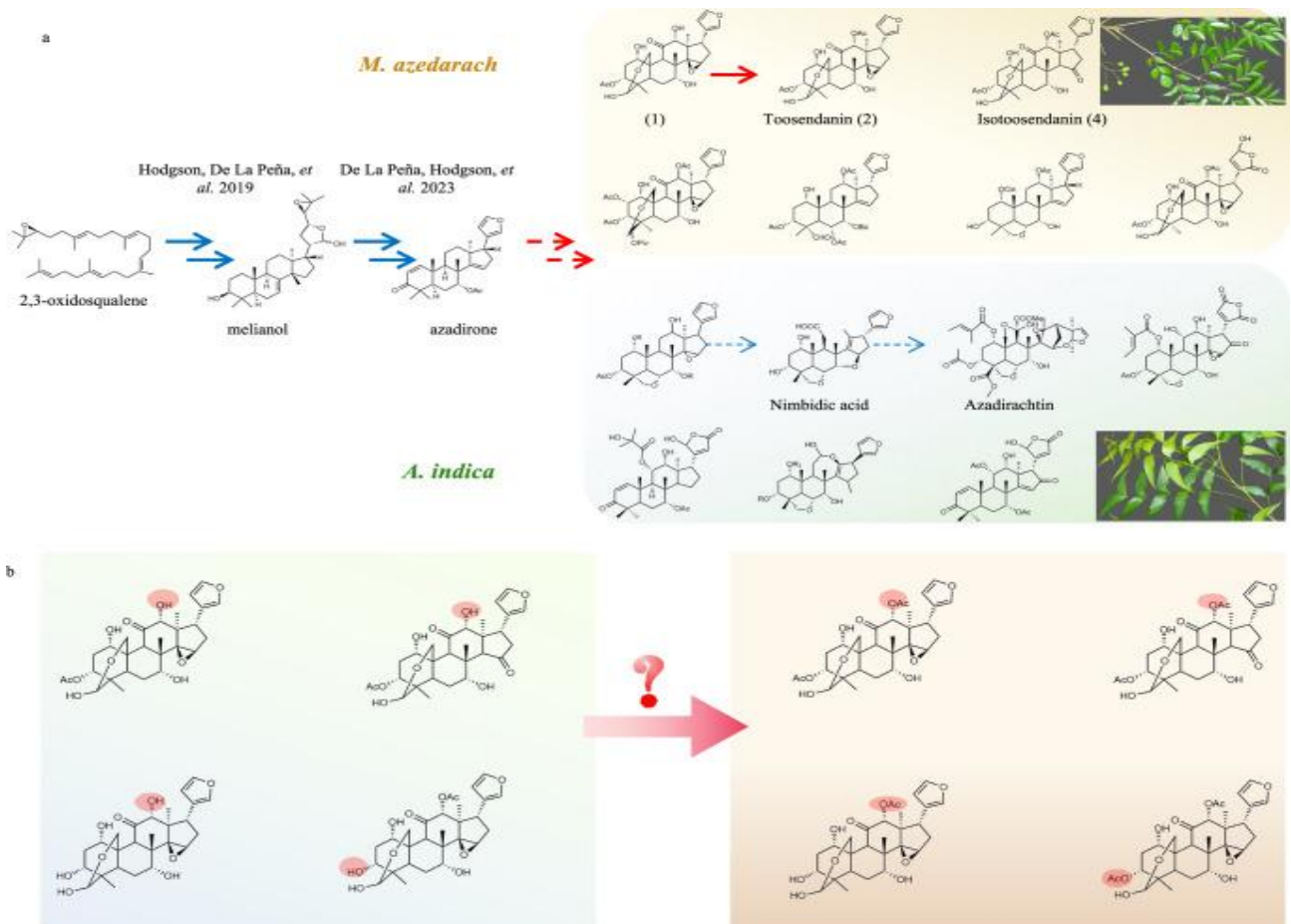


Neem- Genomics

[Comparative genomics provides insights into the biogeographic and biochemical diversity of meliaceous species.](#)

Liu J, Wang Z, Su X, Leng L, Liu J, Zhang F, Chen S, Zhang Y, Wang C. Nat Commun. 2025 Mar 17;16(1):2603. doi: 10.1038/s41467-025-57722-9.PMID: 40097398

Meliaceous plants such as *Azadirachta indica* (neem) and *Melia azedarach* (chinaberry) contain large amounts of limonoids with unique anti-insect activities. However, genes responsible for downstream modifications of limonoids are not well known. Here, we improve the genome assemblies of neem and chinaberry to the telomere-to-telomere (T2T) level. Allopatric speciation of the two plants is confirmed by the lineage-specific inversion of chromosome 12 in the neem lineage. We further identify two BAHD-acetyltransferases (ATs) in chinaberry (MaAT8824 and MaAT1704) that catalyse acetylation at both the C-12 and C-3 hydroxyl groups of limonoids, whereas the syntenic neem copy (AiAT0635) does not possess this activity. A critical N-terminal region (SAGAVP) is crucial for the acetylation of AiAT0635, and swapping it into the MaAT8824 version (CHRSSG) can endow it with acetylation activity. Our improved genome assemblies provide insights into allopatric speciation of neem, as well as limonoid biosynthesis and chemical diversity in meliaceous plants.



Neem for Sustainable Environment & Green Synthesis

[Evaluation of neem gum-poly\(acrylic acid\) based adsorbent for cationic dye removal using adsorption isotherm, kinetics and thermodynamics: Linear regression models.](#)

Tirkey N, Mishra S. *Int J Biol Macromol.* 2025 Mar 17;307(Pt 3):142059. doi: 10.1016/j.ijbiomac.2025.142059. Online ahead of print. PMID: 40101821

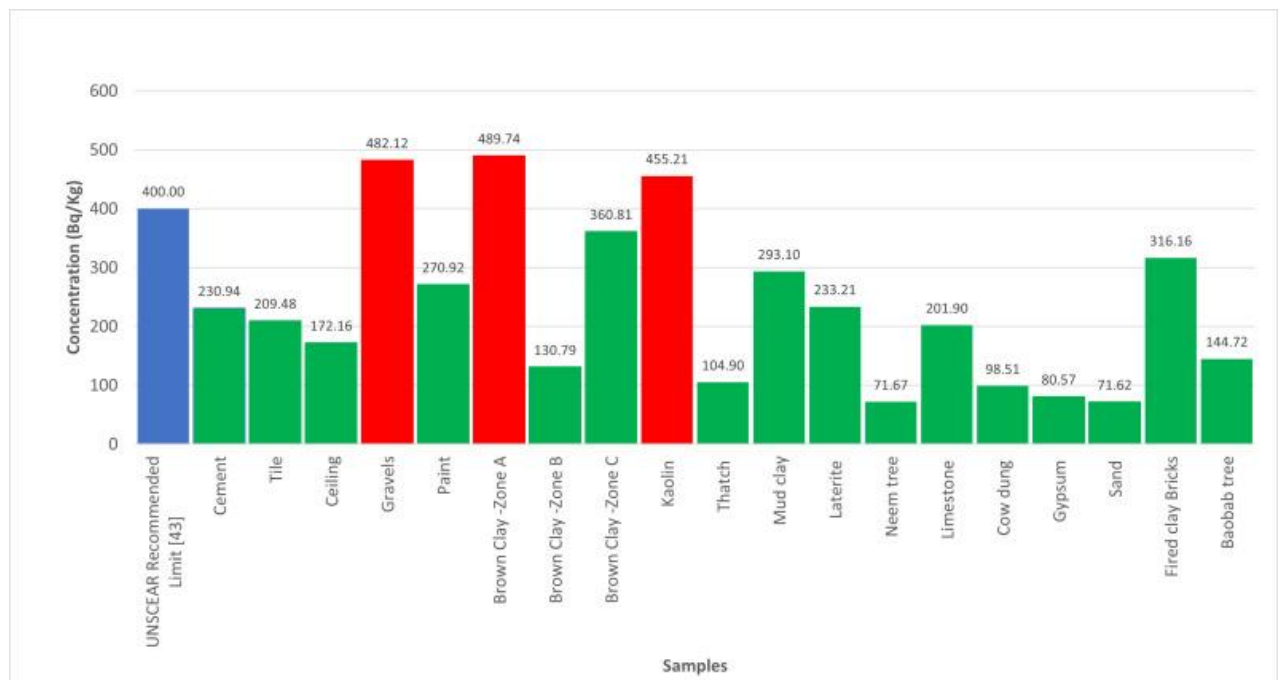
Cationic dye pollution is detrimental to human health as it accumulates in the cytoplasm and poses toxic, mutagenic and carcinogenic effects. Many dye adsorbents report secondary waste generation, non-biodegradability, high costs and energy. Therefore, in this work, Neem gum (Ng) is utilised as a propitious candidate for water treatment due to its tuneable chemical structure, renewability, biodegradability, sustainability, non-toxicity and low cost. The Ng-g-p(AA)-cl-MBA hydrogel is synthesised via a free-radical polymerization technique to find its efficacy towards the adsorption of cationic dyes rhodamine B(RhB) and methylene blue(MB) and systematically characterized using FT-IR, TGA, XRD, BET and FE-SEM analysis. Various parameters were optimized for achieving the maximum adsorption efficiency including the initial concentration, pH, temperature, adsorbent dosage, and contact time. Adsorption Isotherm, Kinetics and Thermodynamics were studied to understand the adsorption behaviour of Ng-g-p(AA)-cl-MBA towards the dyes. The adsorption behaviour was best simulated by Langmuir's model with a maximum adsorption capacity (Q_m) of 552.49 and 421.94 mg/g towards RhB and MB respectively, it obeyed a pseudo-second-order rate of adsorption and followed an exothermic and spontaneous process. It also depicted good regeneration and reusability features making it a promising candidate for dye effluent adsorption.

[Gamma activity concentration from building materials: Estimation of gamma absorption and indoor radon concentration in Katsina State, Nigeria.](#)

Gambo N, Ramli RM, Noor Azman NZ. *PLoS One.* 2025 Mar 12;20(3):e0318497. doi: 10.1371/journal.pone.0318497. eCollection 2025. PMID: 40073067

In this research, nineteen (19) samples were collected and analyzed with the following objectives: to evaluate the activity concentration of radionuclides, assess gamma absorption, determine indoor radon concentration, and evaluate the public health impact of building materials used in Katsina State, Nigeria. The study aimed to provide critical data that would inform safe construction practices and regulatory compliance. Samples were sourced locally from various quarry sites, while materials such as cement, paint, tiles, and ceiling materials were purchased from local markets. The methodology involved measuring radionuclide activity concentrations using gamma-ray spectroscopy with a Thallium-doped Sodium Iodide (NaI (TI)) detector, a highly sensitive method suitable for detecting gamma emissions from radionuclides. Radon gas was identified as the primary radiation source. Results revealed varying activity concentrations of radionuclides across different building materials. Most samples, except for Gravel, Brown Clay (Zone A and C), Kaolin, and Fired Clay Bricks, were below the recommended limits for radionuclide. Similarly, for, except for Cement and Thatch, samples were generally below the average

value of 35 Bq/kg. However, several samples including Gravel, Paint, Brown Clay (Zones A, B, C), Thatch, Mud Clay, Laterite, Neem tree, Limestone, Fired Clay Bricks, and Gypsum exceeded the average value of 30 Bq/kg. The overall average activity concentrations across samples were: 232.421, : 11.791, and : 51.1858 all in Bq/kg. The average Radium equivalent and Gamma index was 113.8 Bq/kg and 0.22, respectively, with an alpha index of 0.11. The external and internal hazard indexes averaged 0.2292 and 0.3102, indicating that these materials pose no significant radiological health risk when used in construction, as all values are below international guidelines of 370 Bq/kg and 1 mSv/y. This study concludes with a recommendation for public awareness on the effects of radiation and the need for continued monitoring and regulation of radiation exposure. The significance of this study lies in its contribution to public health and safety, supporting regulatory compliance and helping to prevent potential health risks associated with construction materials.



[Green synthesis of silver nanoparticles using neem and turmeric extract and its antimicrobial activity of plant mediated silver nanoparticles.](#)

Kumar Singh R, Nallaswamy D, Rajeshkumar S, Varghese SS.J Oral Biol Craniofac Res. 2025 Mar-Apr;15(2):395-401. doi: 10.1016/j.jobcr.2025.02.005. Epub 2025 Feb 17.PMID: 40034373

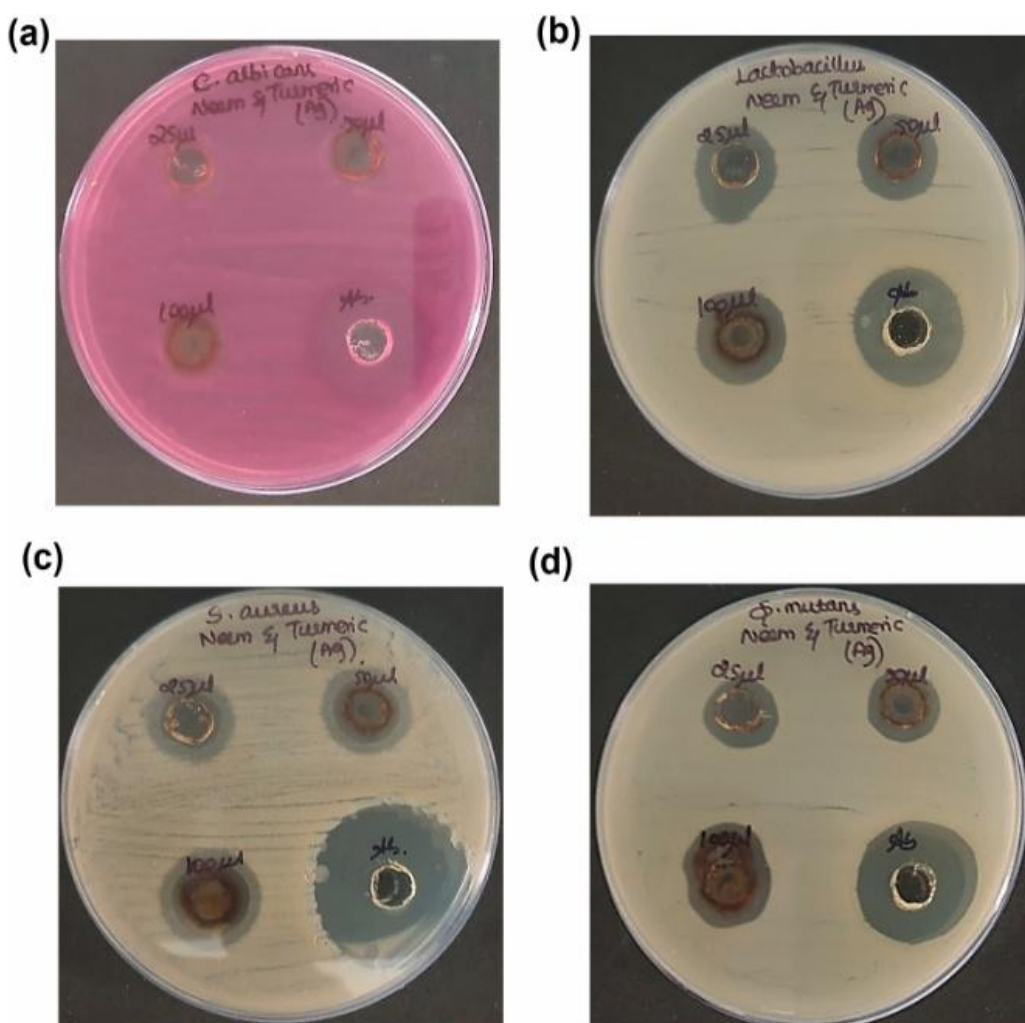
Introduction: The green synthesis of silver nanoparticles has gained attention for being environmentally friendly and cost-effective. This study investigates the synthesis of silver nanoparticles using neem and turmeric extracts, which serve as natural reducing and capping agents, with a focus on characterizing these nanoparticles and assessing their antimicrobial properties against oral pathogens.

Materials and methods: Neem and turmeric extracts were prepared by heating their powdered forms in distilled water, followed by filtration. The extracts were then mixed with a silver nitrate solution, and the reaction was stirred for 24-48 h. The resulting

nanoparticles were characterized using UV-Visible spectroscopy, SEM, EDAX, and XRD analysis. The antimicrobial activity of the nanoparticles was tested against four oral pathogens using the agar well diffusion method.

Results: Successful synthesis of silver nanoparticles was confirmed by a color change and characterization analyses. UV-Visible spectroscopy showed a peak at 440 nm, indicating nanoparticle formation. SEM revealed spherical and uniform nanoparticles, while EDAX confirmed the presence of silver. XRD analysis showed the crystalline nature of the nanoparticles, with sizes ranging from 4 nm to 14.81 nm. The nanoparticles exhibited significant antimicrobial activity against *Staphylococcus aureus*, *Streptococcus mutans*, and *Lactobacillus* species, but were less effective against *Candida albicans*.

Conclusion: The study demonstrates the effectiveness of neem and turmeric extracts in the green synthesis of silver nanoparticles, which exhibited notable antimicrobial activity. This research underscores the potential of plant-mediated synthesis for developing eco-friendly antimicrobial agents.



Neem for Human Health

[Polylactic-Co-Glycolic Acid/Alginate/Neem Oil-Reduced Graphene Oxide as a pH-Sensitive Nanocarrier for Hesperidin Drug Delivery: Antimicrobial and Acute Otitis Media Assessments.](#)

Al-Zuhairy SAKS, Elhabal SF, Mohamed Elrefai MF, Hababeh S, Nelson J, Fady M, Elzohairy NA, Ewedah TM, Mousa IS, Hamdan AME. Pharmaceuticals (Basel). 2025 Mar 7;18(3):381. doi: 10.3390/ph18030381.PMID: 40143156

Background/Objectives: Hesperidin (HSP) is a potent phytochemical antioxidant and anti-inflammatory agent that protects against otitis media. However, due to its low solubility and bioavailability, a suitable delivery method is needed to overcome these problems. A hydrogel is a promising nanocarrier for controlled drug delivery in response to external stimuli, such as pH variations. **Methods:** Graphene oxide (GO)-based nanocarriers that encapsulate hesperidin (HSP) were further coated with a polylactic-co-glycolic acid/alginate (PLGA-Alg) hydrogel before being integrated into a green neem oil (N.O.) double emulsion to produce a synergistic effect and then characterized by different assays. **Results:** The nanocarriers exhibited a substantial particle size (168 ± 0.32 nm), with high encapsulation ($89.86 \pm 0.23\%$) and a zeta potential of 37 ± 0.43 mV. In vitro release studies conducted over 96 h indicated a sustained HSP release of 82% at pH 5.4 and 65% at pH 7.4. The GO-HSP-loaded neem oil double emulsion formulation exhibits substantial antibacterial activity, as evidenced by inhibition zones of 39 ± 0.02 mm against *Staphylococcus epidermidis*, and considerable antifungal activity against *Candida albicans*, with an inhibition zone of 43 ± 0.13 mm, along with biofilm inhibition activity. The formulation demonstrated antioxidant activity (5.21 $\mu\text{g/mL}$) and increased cell viability (90-95%) while maintaining low cytotoxicity in HSE-2 cells. A histopathological analysis confirmed that treatment with the nanocarriers reduced the levels of pro-inflammatory cytokines (IL-1 β , TNF- α , TLR4, IL-6) and raised the levels of antioxidant markers (Nrf-2, SOD) in an in vivo rat model of otitis media. **Conclusions:** GO-based nanocarriers integrated into a neem oil double emulsion and coated with PLGA-Alg hydrogel deliver hesperidin with sustained release and enhanced antibacterial, antifungal, and antioxidant properties. This formulation may be used to treat otitis media and other oxidative stress diseases.

[Utilization of Local Remedies among Dengue Patients Admitted to the Emergency Department of a Tertiary Care Center: An Observational Study.](#)

Rajpal A, Pannu AK, Behera A, Sharma N, Hanumanthappa MK. Indian J Crit Care Med. 2025 Feb;29(2):148-150. doi: 10.5005/jp-journals-10071-24896. Epub 2025 Jan 31.PMID: 40110151

Background: Dengue viral infection (DVI) affects ~ 400 million people annually, with ~ 100 million cases causing clinical illness. Limited therapeutic options often lead patients to adopt alternative remedies. This study evaluates the prevalence and impact of such remedies on outcomes in patients admitted to a tertiary care emergency department.

Materials and methods: A single-center, observational study was conducted from July 2022 to September 2023, including 170 patients aged >12 years with severe DVI or DVI with warning signs, as per the World Health Organization (WHO) criteria. The use of local remedies such as goat's milk, papaya leaves/extract, neem leaves, giloy juice, and alternative medicine was documented. Outcomes, including mortality and hospital stay duration, were compared between remedy users and non-users.

Results: The mean age of participants was 36 years, with 60% males and 50% from rural areas. 35.29% used local remedies, with goat's milk (23.52%) and papaya leaves/extract (15.29%) being the most common. The median duration of remedy use was 2 days. Mortality was 6.67% in remedy users and 8.4% in non-users ($p = 0.28$). The median hospital stay was 4 days for both groups, with no significant outcome differences.

Conclusion: One-third of DVI patients used local remedies, with goat's milk being the most prevalent. However, no significant impact on mortality or hospital stay was observed.

[Kinetic Study of In Vitro Release of Neem from Chitosan Biopolymer and Assessment of Its Biological Effectiveness.](#)

Nishshanka Y, Thambiliyagodage C, Jayanetti M. Polymers (Basel). 2025 Mar 6;17(5):702. doi: 10.3390/polym17050702. PMID: 40076194

The study examined the sustained release of neem from the polymeric carrier system chitosan by varying the drug content, ionic strength of the release medium, and pH. Six different kinetic models, i.e., Korsmeyer-Peppas (KP), Peppas-Sahlin (PS), Higuchi, Hixson-Crowell, Zero order, and First order were used to investigate the drug release kinetics. Based on the R^2 values, the KP and PS models were chosen from the examined models to study the drug release mechanism from the chitosan biopolymer. The values found for model parameters n and m in the KP and PS models differ noticeably, suggesting that Fickian diffusion and Case II relaxation are important components of the neem release mechanism from chitosan. At lower ionic strengths and lower pH values, neem is released from the composite mostly by Fickian diffusion. The diphenyl-2-picrylhydrazyl assay served to assess the composite's antioxidant properties. The composite's antioxidant properties ranged from $3.56 \pm 1.89\%$ at $10 \mu\text{g/mL}$ to $51.28 \pm 1.14\%$ at $70 \mu\text{g/mL}$. The ability of the composite to inhibit the denaturation of egg albumin was also tested and it ranged from $59.68 \pm 0.93\%$ at $25 \mu\text{g/mL}$ to $187.63 \pm 3.53\%$ at $1600 \mu\text{g/mL}$. The drug composite has exhibited antibacterial activity against *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Staphylococcus aureus*, and proved to be highly effective against *P. aeruginosa* at lower concentrations and against *S. aureus* at higher concentrations. The resulting inhibition zones for *P. aeruginosa* at 5 and 10 mg/mL concentrations were $16.5 \pm 2.25 \text{ mm}$, and $14.83 \pm 0.6 \text{ mm}$, respectively, whereas for *S. aureus*, it was $16.67 \pm 0.33 \text{ mm}$ at 20 mg/mL. The neem-chitosan composite's minimum inhibitory concentration/minimum bactericidal concentration ratio for *K. pneumoniae*, *P. aeruginosa*, and *S. aureus* was greater than 4, suggesting that they trigger bacteriostatic outcomes, whereas for *E. coli*, it was 4, which means that bactericidal effects were evident.

[A randomized clinical comparative evaluation of interappointment flare-ups on placing *Azadirachta indica*, garlic, Triphala, and calcium hydroxide as intracanal medicament, in primary endodontic lesion.](#)

Kishan KV, Shah N, Mamatha KV, Sreekumari L, Parikh M.J Conserv Dent Endod. 2025 Feb;28(2):155-160. doi: 10.4103/JCDE.JCDE_824_24. Epub 2025 Feb 3.PMID: 40046471

Aim: The purpose of the study was to clinically evaluate interappointment flare-ups, on placing *Azadirachta indica* (neem), garlic (*Allium sativum* L.), Triphala, and calcium hydroxide (CH) as an intracanal medicament (ICM), using Verbal Rating Scale (VRS) in a patient with a primary endodontic lesion.

Methodology: Two hundred and forty patients indicated for root canal therapy were divided into two main groups as single-rooted teeth and multirooted teeth. Each group was further subdivided into four subgroups of 30 samples each. After the access opening, instrumentation was done as per the canal configuration. The herbal medicaments were prepared as an aqueous extract. The placement of ICM in the subgroups was randomly determined by computerized randomization. Interappointment flare-up and pain were assessed using VRS on 1, 3, 7, and 14 days.

Statistical analysis used: The intergroup comparisons of the incidence of flare-up were done using analysis of variance, followed by *post hoc* Tukey's test to test for the difference among individual groups.

Results: There was a statistically significant difference between the four groups, with $P = 0.02$ for multirooted teeth and 0.03 for single-rooted teeth. The *post hoc* Tukey's test showed the intergroup comparison of the flare-up incidence between garlic and Triphala to be statistically significant favoring Triphala, with $P = 0.004$ in single-rooted teeth and 0.008 in multirooted teeth.

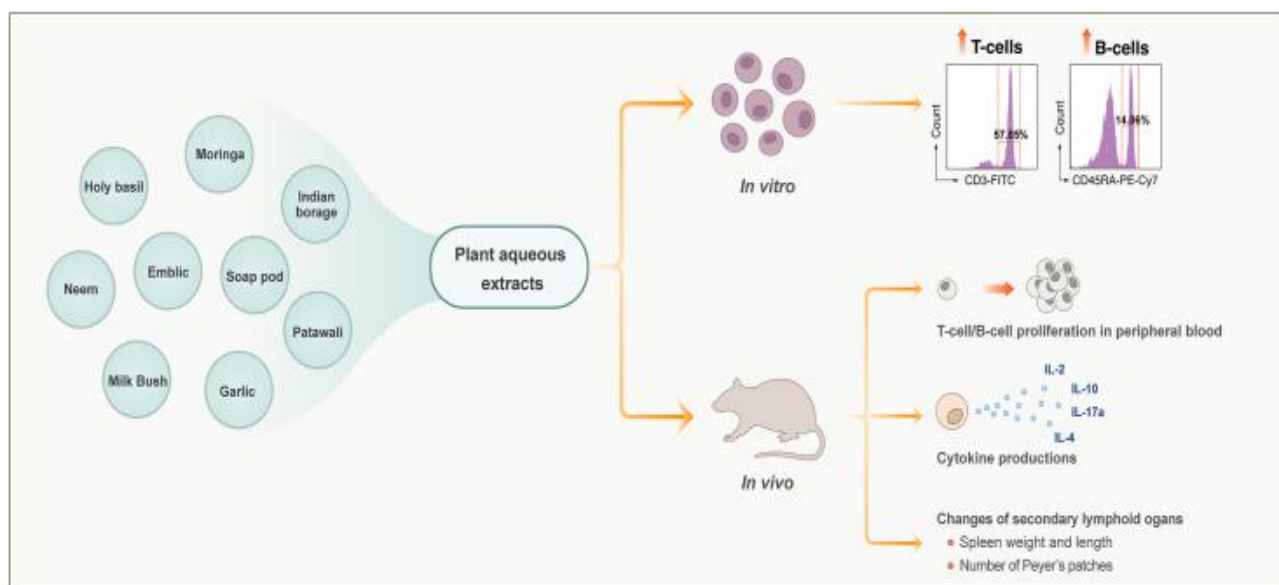
Conclusion: Although there was no statistical significance between them, Triphala can be considered an alternative to CH as ICM. However, neem and garlic showed poor results.

[Screening of aqueous plant extracts for immunomodulatory effects on immune cells and cytokine production: *In vitro* and *in vivo* analyses.](#)

Dobutr T, Jangpromma N, Patramanon R, Daduang J, Kulchat S, Areemit J, Lomthaisong K, Daduang S.Heliyon. 2025 Feb 13;11(4):e42692. doi: 10.1016/j.heliyon.2025.e42692. eCollection 2025 Feb 28.PMID: 40034324

This study investigates the immunomodulatory effects of various aqueous plant extracts on immune cells and cytokine production. *In vitro*, several extracts, including holy basil (*Ocimum sanctum*), patawali (*Tinospora crispa*), and Indian borage (*Plectranthus amboinicus* L.), significantly increased CD3⁺ T-cell populations, while soap pod (*Acacia concinna*), garlic (*Allium sativum* L.), and neem (*Azadirachta indica*) also boosted CD45RA⁺ B-cells. *In vivo*, the extracts had subtle effects on spleen morphology and Peyer's Patches, with milk bush (*Euphorbia tirucalli* L.) and Indian borage enhancing T-cell responses, while soap pod stimulated B-cells. Additionally, we observed that Neem and milk bush significantly suppressed B-cell populations. Furthermore, cytokine analysis showed that garlic and patawali reduced IL-2, while soap pod, holy basil, and patawali

increased TNF-alpha levels. Soap pod also elevated IL-10 and IL-17A, indicating both anti-inflammatory and pro-inflammatory signaling, while patawali induced an increase in IL-4. In conclusion, Thai medicinal plants show strong potential as both immunostimulants and immunosuppressants. They can enhance lymphocyte proliferation, particularly in T-cells, and modulate B-cell populations. Their aqueous extracts play a key role in regulating Th1, Th2, and Th17 cytokine production. Thus, these plants could serve as natural agents and alternative medicines for boosting or modulating immune function.



[Fabrication and Efficacy Assessment of a Combination of Polyherbal Facewash Gels for the Treatment of Propionibacterium acnes.](#)

Shrivastava S, Shrivastava S, Tirkey R. Recent Adv Drug Deliv Formul. 2025 Mar 3. doi: 10.2174/0126673878340038250224063731. Online ahead of print. PMID: 40033593

Introduction: Azadirachta indica is also referred to as margosa or neem. It is found throughout the Indian subcontinent. Aegle marmelos L. (family: Rutaceae), sometimes referred to as Bael in Hindi, is a crucial food plant in India. The fruit has traditionally been used for the treatment of inflammation, diabetes, respiratory disorders, diarrhea, and dysentery. Aegle marmelos fruits are abundant in coumarins, carotenoids, terpenoids, and flavonoids. The plant referred to as Camellia sinensis, or tea, is part of the Theaceae family and is often grown in tropical and subtropical regions.

Objective: Acne is a prolonged inflammatory condition of the skin that has a significant negative influence on patients' quality of life all over the world. Although it is most commonly seen in young people, it may impact people of any age. Herbal anti-acne facewash gels were prepared using Carbopol 934 and extracts from Azadirachta indica, Aegle marmelos L., and Camellia sinensis.

Materials and methods: The anti-acne facewash gel formulations were prepared in five different concentrations of 1%, 0.90%, 0.80%, 0.60%, and 0.50%, labeled as F1, F2, F3, F4, and F5, respectively.

Results: The anti-acne properties of the formulations were evaluated. The outcomes demonstrated gels to have an excellent spreading coefficient, a great physical

appearance, and be non-irritating. Standard commercial formulations were used to investigate the effectiveness.

Conclusion: Unlike marketed formulations, the developed formulation 3 (F3) demonstrated an excellent spreading coefficient and good % extrudability. It has been shown to be a more potent and effective polyherbal anti-acne facewash gel for treating acne. In recent years, there has been a rise in the patenting of herbal formulations, and several in vitro and in vivo studies have produced scientific proof of their medicinal efficacy. This work discusses many patented herbal compositions and how they might be used therapeutically to treat different diseases.

[Ethnobotanical Study of Knowledge and Herbal Recipes of Medicinal Plants in Ancient Izki, Al Dakhliya Region, Sultanate of Oman.](#)

Gilani SA, Naureen Z, Hussain J, Naabi TSSA, Amin BS, Mabood F, Haq QMI, Ahmad D, Khan A. Curr Top Med Chem. 2025 Mar 18. doi: 10.2174/0115680266356922250305073400. Online ahead of print. PMID: 40108894

Introduction: The medicinal plants of Izki hold significant ethnopharmacological relevance, serving as primary healthcare resources for generations. These plants exhibit known pharmacological properties, making them crucial for traditional and modern therapeutic applications.

Objectives: The primary goal of this study was to record, conserve, and analyze the traditional knowledge of medicinal plants in Izki. It also aimed to evaluate the therapeutic potential of these plants for treating various ailments while identifying their pharmacological relevance for modern applications.

Materials and methods: The study involved interviews with 300 local residents to record their traditional knowledge of therapeutic herbs. Quantitative methods were employed. Plant specimens were collected, identified, and submitted to the herbarium.

Results: The study recorded 65 medicinal plants (22 cultivated, 43 wild) used for 62 disease categories. Eye diseases (0.721; 13 taxa) and bone fractures (0.700; 13 taxa) showed higher consensus among respondents. FL% analysis highlighted *Tephrosia apollinea* (69.2%), *Trachyspermum ammi* (62.5%), and *Azadirachta indica* (53.3%) as culturally significant. *Rhazya stricta* emerged as an antirheumatic agent, reflecting shared ethnobotanical practices between India and Oman. Plants like *Rhazya stricta*, *Fagonia indica*, *Trachyspermum ammi*, and *Ziziphus spina-christi* demonstrated consistent regional applications, underscoring their potential for pharmacological investigation.

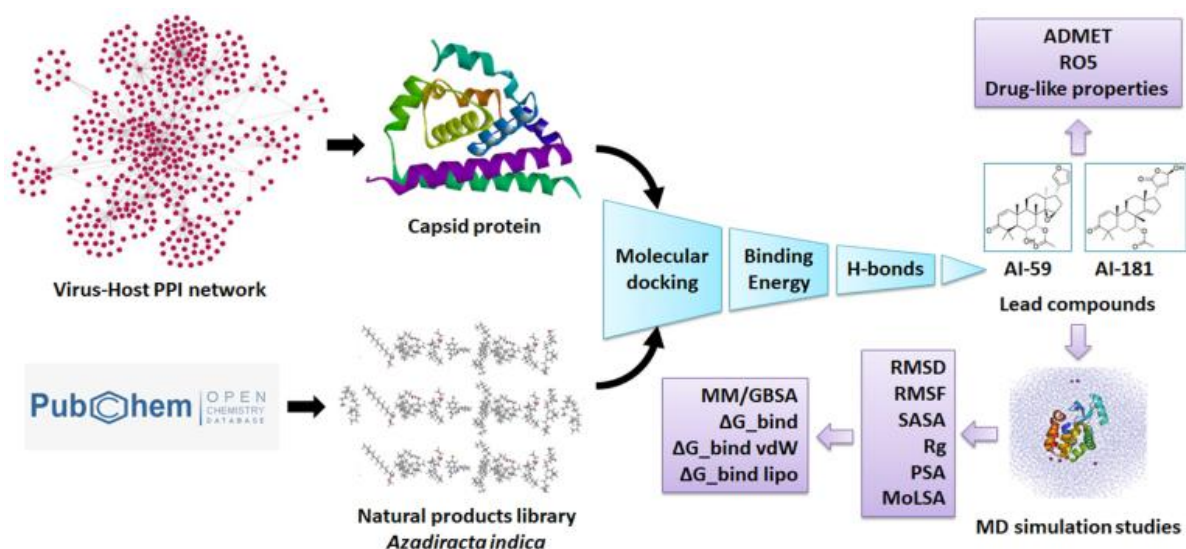
Conclusion: This study underscores Izki's rich ethnobotanical knowledge, with extensive use of leaves, fruits, and whole plants for medicinal, dietary, and hygienic purposes. Conservation efforts, sustainable harvesting, and collaborations with pharmaceutical sciences are essential to validate the pharmacological potential of *Rhazya stricta*, *Fagonia indica*, *Trachyspermum ammi*, and *Ziziphus spina-christi* and bridge traditional knowledge with modern medicine.

[Identification and evaluation of bioactive compounds from *Azadirachta indica* as potential inhibitors of DENV-2 capsid protein: An integrative study utilizing network pharmacology, molecular docking, molecular dynamics simulations, and machine learning techniques.](#)

Khan MAA, Zilani MNH, Hasan M, Hasan N. Heliyon. 2025 Feb 12;11(4):e42594. doi: 10.1016/j.heliyon.2025.e42594. eCollection 2025 Feb 28. PMID: 40051864

Background: Dengue fever is a viral disease caused by the dengue flavivirus and transmitted through mosquito bites in humans. According to the World Health Organization, severe dengue causes approximately 40,000 deaths annually, and nearly 4 billion people are at risk of dengue infection. The urgent need for effective treatments against the dengue virus has led to extensive research on potential bioactive compounds.

Objective: In this study, we utilized a network pharmacology approach to identify the DENV-2 capsid protein as an appropriate target for intervention. Subsequently, we selected a library of 537 phytochemicals derived from *Azadirachta indica* (Family: Meliaceae), known for their anti-dengue properties, to explore potential inhibitors of this protein. **Methods:** The compound library was subjected to molecular docking to the capsid protein to identify potent inhibitors with high binding affinity. We selected 81 hits based on a thorough analysis of their binding affinities, particularly those exhibiting higher binding energy than the established inhibitor ST-148. After evaluating their binding characteristics, we identified two top-scored compounds and subjected them to molecular dynamics simulations to assess their stability and binding properties. Additionally, we predicted ADMET properties using *in silico* methods. **Results:** One of the inhibitors, [(5S,7R,8R,9R,10R,13R,17R)-17-[(2R)-2-hydroxy-5-oxo-2H-furan-4-yl]-4,4,8,10,13-pentamethyl-3-oxo-5,6,7,9,11,12,16,17-octahydrocyclopenta[a]phenanthren-7-yl] acetate (AI-59), showed the highest binding affinity at -10.4 kcal/mol. Another compound, epoxy-nimonol (AI-181), demonstrated the highest number of H-bonds with a binding affinity score of -9.5 kcal/mol. During molecular dynamics simulation studies, both compounds have exhibited noteworthy outcomes. Through molecular mechanics employing Generalized Born surface area (MM/GBSA) calculations, AI-59 and AI-181 displayed negative ΔG_{bind} scores of -74.99 and -83.91 kcal/mol, respectively. **Conclusion:** The hit compounds identified in the present investigation hold the potential for developing drugs targeting dengue virus infections. Furthermore, the knowledge gathered from this study serves as a foundation for the structure- or ligand-based exploration of anti-dengue compounds.



[Neem seed protein hydrolysates alleviate iron-induced cardiac injury via effects on angiotensin-converting enzyme, purinergic enzymes, redox balance, and lipid metabolism.](#)
Acho MA, Erukainure OL, Salau VF, Osemwegie OO, Amonsou E, Arise RO. Arch Physiol Biochem. 2025 Mar 28;1-13. doi: 10.1080/13813455.2025.2483912. Online ahead of print. PMID: 40152915

This study assessed the cardioprotective effects of <1 kDa peptide fractions from neem seed protein hydrolysates (NSPHs) in cardiac tissues *ex vivo*. Oxidative injury was induced in cardiac tissues from male Wister rats by incubating with 0.1 mM FeSO₄ (pro-oxidant) for 30 minutes. Untreated tissues lacked peptide fractions, while normal control tissues lacked peptide and pro-oxidant. Treatment with the peptides increased the activities/levels of catalase, superoxide dismutase, ENTPDase, 5'NTPDase, glutathione, and HDL-cholesterol. Conversely, the levels/activities of malondialdehyde, nitric oxide, cholesterol, LDL-cholesterol, ACE, acetylcholinesterase, ATPase decreased following treatment with NSPH peptide fractions. Furthermore, the peptides depleted oxidative metabolites, while concomitantly inactivating plasmalogen synthesis and beta-oxidation of long-chain saturated fatty acids. These findings suggest that <1 kDa peptide fractions from neem seed protein hydrolysates have cardioprotective properties, potentially offering a natural therapeutic option for managing oxidative cardiac dysfunction through the regulation of oxidative stress, cholinesterase and purinergic activities, and lipid metabolism.

[In Vitro Antidiabetic Potential and Influence of Neem Oil Extract on Biochemical Indices of Toxicity Following Sub-Acute Administration in Rats.](#)

Brai B, Amosun B, Komolafe T, Joseph R, Komolafe K. Niger J Physiol Sci. 2025 Jan 14;39(1):77-85. doi: 10.54548/njps.v39i1.10. PMID: 40156810

Introduction: Neem (*Azadirachta indica* A. Juss, Meliaceae) is a popular medicinal plant widely sought for its antipyretic, antimalarial, anti-inflammatory, antidiabetic, and antibacterial properties, among others.

Methods: Cold-pressed oil from neem seed (NOil) and its cyclohexane-methanol extract (NOHM) were evaluated for their effects on α -amylase and α -glucosidase activities *in vitro*. Also, NOil (75, 150, and 200 mg/kg) and NOHM (200, 400, and 800 mg/kg) were orally administered to normal experimental rats for 30 days, following which the lipid profile, antioxidant status, and serum and tissue indices of hepatic, renal, and cardiac damage were evaluated.

Results: NOHM caused significantly higher ($p < 0.05$) α -glucosidase inhibition than NOil. Respectively, the α -amylase and α -glucosidase inhibitory effects of NOil ($IC_{50} = 4.88 \pm 0.38 \mu\text{g/mL}$ and $74.54 \pm 25.26 \mu\text{g/mL}$) and NOHM ($5.00 \pm 0.22 \mu\text{g/mL}$ and $14.17 \pm 5.14 \mu\text{g/mL}$) were superior to that of acarbose ($9.67 \pm 0.09 \mu\text{g/mL}$ and $>150 \mu\text{g/mL}$). NOHM produced a stronger hypoglycemic effect than NOil. However, no biochemical alteration of toxicological importance was caused by either following subacute administration to animals as the organ-body weight ratio and serum and tissue indicators of organ damage were not adversely altered.

Conclusion: The present findings support the safety of NOil and NOHM at the evaluated dosages. The effect of both oil and extract on key carbohydrate-metabolizing enzymes could partly explain the biochemical rationale underlying the popular ethnomedicinal application of the seed in diabetic management.

[Exploring the dermal safety of green-synthesized Ag-TiO₂ nanocomposites for topical applications.](#)

Rana A, Parashar S, Singh D, Singh K, Chanda D, Pal A, Srivastava R, Sharma SN.RSC Adv. 2025 Mar 27;15(12):9320-9334. doi: 10.1039/d4ra08199d. eCollection 2025 Mar 21.PMID: 40151534

We investigated Ag-TiO₂ nanocomposites (NCs) synthesized using leaf extracts of *Azadirachta indica* and *Mangifera indica* for topical applications. The Ag-TiO₂ NCs were first characterized by their spherical shapes, with sizes ranging from 20-26 nm to 5-6 nm, and a zeta potential value between -27 and -23 mV. DLS analysis revealed average particle sizes of 671 nm and 573 nm for Ag-TiO₂ NCs synthesized from *A. indica* and *M. indica*, respectively. The MICs of the nanocomposites were determined *via* dilution in both Gram-positive and Gram-negative bacteria to determine the optimal concentration for dermal applications. The cytotoxicity assay (MTT) of ATN and ATM compounds at MICs of 312.5 µg mL⁻¹, 625 µg mL⁻¹, and 1250 µg mL⁻¹ showed that they were nontoxic to fibroblast cells. Further assessments of acute and subacute dermal safety were conducted on Charles Foster rats with NCs applied at 625 µg mL⁻¹, 3125 µg mL⁻¹, and 6250 µg mL⁻¹ concentrations. Observations were made for any signs of dermal toxicity using behavioural and physical indices. In acute dermal toxicity, the NCs were applied once, and in subacute dermal toxicity, NCs were applied once daily for 28 days and observed for any sign of dermal toxicity using observation indices like behavioural changes, edema scores, and erythema scores. Post-experiment analyses of body weight, serum biochemistry, oxidative stress, and hematological profiles revealed that the nanocomposites exhibited significant antimicrobial activity. Notably, the safety evaluations indicated no adverse changes, suggesting these NCs are well-tolerated for dermal applications and show great promise for future topical applications.

