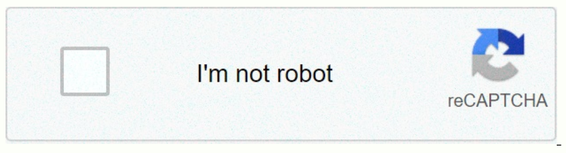

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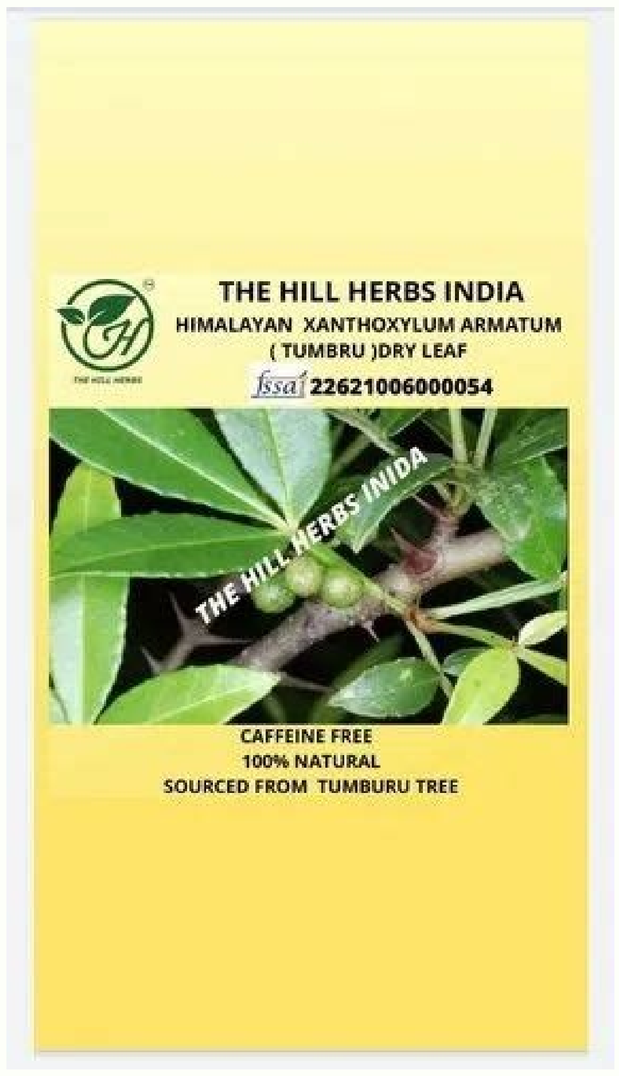
Zanthoxylum armatum medicinal uses

Zanthoxylum capense medicinal uses. Zanthoxylum armatum uses.

Volume 229, 30 January 2019, Pages 326-341 rights and contentZanthoxylum armatum DC. possesses several medicinal properties and has been commonly used in different indigenous medicinal practices to cure several diseases because of its stomachic, carminative and anthelmintic properties.This review paper aims to provide an update on and analysis of information about the ecology, uses, phytochemistry, pharmacology, trade opportunities, policy gaps for the commercialization of this species forming a basis for further scientific innovationsInformation was gathered through a search of different books, journals, articles, annual reports, proceedings and web-based materials.Alkaloids, sterols, phenolics, lignins coumarins, terpenoids and flavonoids have been identified from leaves, fruits, stem, bark and seeds. Its trade value is also very high with its manifold applications in Ayurveda, allopathy, general pharmacy, and other industries. Antimicrobial, antiviral, antioxidant, anti-inflammatory, cytotoxic, hepato-protective, insecticidal/larvicidal effects are of particular relevance.It is one of the prioritized medicinal plants for economic development in Nepal. Owing to its diverse applications, the species can be developed as an important commodity for alleviation of poverty in rural areas.



The various ethno-pharmacological applications of Zanthoxylum armatum have been verified by several related researches. More extensive study on the individual specific phyto-component can lead to novel innovations for the well-being of mankind.Zanthoxylum armatum DC. (Rutaceae), commonly called Timur in Nepal (English: Nepal pepper or prickly ash), is an important medicinal plant. zodufapopaveho

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Hence an effort has been made to gather all the fragmentary information of Zanthoxylum armatum regarding the uses, phytochemistry, pharmacology and to analyze the current state of knowledge and possible opportunities that can be tapped for the overall benefit of the rural communities. It is important to establish a strong linkage between the traditional knowledge and modern researches to authenticate the ages old traditional ethno-medicinal practices. Hence it is expected that this information will be of relative significance to all the stakeholders, students and researchers for future research prospects.Zanthoxylum armatum (Fig. 1) is a small aromatic tree or large shrub up to 6 m high. gohupidukena Branches are glabrous, usually armed with straight or slightly compressed, reddish brown stipular spines.

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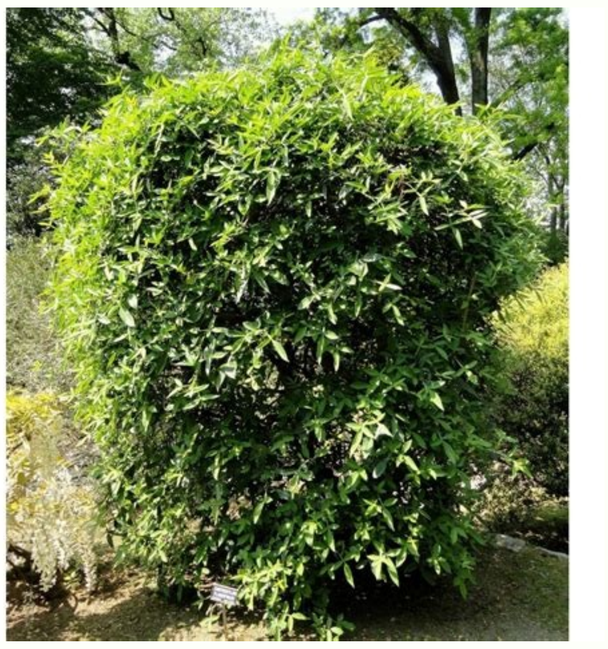

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maSource: Manadhar, 2002.In other countries/Zanthoxylum armatum has been used extensively in traditional indigenous medicinal practices in Nepal by different ethnic communities. Several ethnobotanical studies have documented the various ethnomedicinal uses in different types of ailments. The seeds and barks of Z. armatum are used as aromatic, carminative, tonic in fever, dyspepsia (Anonymous, 1970). In stomach problems, the seeds powder is taken with warm water. The fruits and seeds are used for curing cholera, tooth ache and as leechVarious phytochemical constituents like terpenoids (Fig. 3), flavonoids (Fig. 4), alkaloids (Fig. 5), phenolics, lignins (Fig. 6), coumarins (Fig. 7), glycosides and benzoids, steroids (Fig. 8), fatty acids, alkenoic acids, amino acids have been extracted from different parts of the plant i.e. seed, leaf, fruit, root and bark (Li et al., 2006, Tiwary et al., 2007, Negi et al., 2011, Negi et al., 2012, Waheed et al., 2011, Joshi and Gyawali, 2012, Barkatullah et al., 2013, Brijwal et al., 2013, Different studies have shown that Zanthoxylum armatum possesses different pharmacological and biological activities like larvicidal, antifungal, hepato-protective, keratolytic, antiviral, antiprotozoan, pesticidal/insecticidal, antibacterial, anthelminthic, allelopathic from different extracts i.e., dichloromethane, acetone, aqueous, ethanol, methanol, petroleum ether etc.The tradition of collection and sale of Zanthoxylum armatum in Nepal has a long history and can be dated back to the early 80s, when the trade started with India, before which it was used by the rural communities for domestic purposes (Malla et al., 1993). Historically, the rural people traded different medicinal plants including Zanthoxylum armatum as a source of their income (Manandhar, 1986, Kunwar et al., 2018). There was a social mechanism of exchange and distribution of Timur, and theSpecies of Zanthoxylum are of great economic importance as source of edible fruit, oil, wood, raw materials for industries, medicinal plant, ornamental, culinary application (Adesina, 2005, Seidemann, 2005). Different plant parts leaves, fruits, stem, bark, seeds and root are used in indigenous medicine preparation against various diseases (Singh and Singh, 2011). This plant species is not only used for pharmaceutical purposes, but also in the flavoring and fragrance industries. The diverseThe National Conservation Strategy (NPC, 1988) emphasized on the enforcement of legislations for sustainable extraction and utilization of MAPs of Nepal. Similarly, Master Plan for the Forestry Sector (DoF, 1989), Industrial Enterprises Act (GoN, 1992), Forest Act (GoN, 1993) and Regulations (GoN,1995), Herbs and Non-Timber Forest Products Development Policy (DPR, 2004) have emphasized on the subsequent development of the NTFPs including MAPs for uplifting the livelihood of the ruralZanthoxylum armatum is one of the important medicinal plants having a wide array of household, commercial and ethno-medicinal applications.
The fruits, leaves, seeds and stem bark are used in headache, fever, toothache, tonsillitis, diarrhea, dysentery, altitude sickness. The fruits contain essential oil that possesses antiseptic, disinfectant properties so it has its wide application in pharmaceuticals and flavoring industries. The main constituents of the essential oil are limonene andNirmala Phuyal is thankful to Dabur Nepal Private Limited for the grant 'Late Sri Ashok Chand Burman Dabur CSR Fellowhip 01/2016'. The authors would like to thank Michael Heinrich and the other three anonymous reviewers whose constructive comments and suggestions helped to improve this article. We are grateful to Prof. Dr. Mohan Siwakoti, Head Central Department of Botany for his support. Associate Prof. Dr. Suresh Kumar Ghimire, Central Department of Botany and Mr. Ganga Datt Bhatt, AssistantF. Ahmad et al.E. Ahmed et al.N. Akhtar et al.N. Akhtar et al.T.A. Alamgeer et al.AnonymousANSABM. Arshad et al.M. Bachwani et al.S.R. Baral et al.Irbar Barkatullah et al.M. Barkatullah et al.N.P. BalamiF. Batool et al.S. Bharti et al.G.D. Bhatt et al.T.D. Bhatt et al.V. Bhatt et al.S. Bhattacharya et al.S. Bhattacharya et al.L. Brijwal et al.CSIRCSIRN.G. Das et al.DFOA. Dikshit et al.DoFDoFDoFDoFDPRDPRDPRDPRDPRDPRDPRDPR, 2016.
Medicinal Plants of Nepal (RevisedSecond Edition). Department of Plant Resources, Ministry of Forest and...S. Dube et al.D.M. EdwardsZanthoxylum armatum DC (Z. armatum) is renowned not only as a culinary spice but also as a staple in traditional ethnic medicine, predominantly in Southeast Asia and various other regions. Recent research has unveiled its multifaceted pharmacological properties, including anti-inflammatory, antibacterial, and toothache relief effects. Nonetheless, some studies have reported the potential toxicity of Z. armatum, emphasizing the need to further explore its toxicity mechanisms for safer application.This study investigated the effect and mechanism of hepatotoxicity in BRL-3A cells induced by Z. armatum.The compounds of the ethyl acetate extract of Z. armatum (ZADC-EA) were identified by ultrahigh performance liquid chromatography coupled with quadrupole-orbitrap high resolution mass spectrometry (UPLC-Q-Orbitrap HRMS). The hepatotoxicity of the extract was evaluated by detecting cell viability, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and lactate dehydrogenase (LDH) activity, and apoptosis. Endoplasmic reticulum stress, autophagy, and apoptosis were detected by Ad-mCherry-GFP-LC3B, flow cytometry, and Western blot to explore the mechanism of hepatotoxicity induced by ZADC-EA.UPLC-Q-Orbitrap HRMS analysis revealed the presence of compounds belonging to flavonoids, terpenoids, and alkaloids. The IC50 value of ZADC-EA was 62.43 μg/mL, the cell viability of BRL-3A decreased in a time-dose dependent manner, and the levels of AST, ALT, and LDH were upregulated. In addition, ZADC-EA-induced increased expression of eIF2α-ATF4-CHOP pathway proteins, inhibited autophagy, and promoted apoptosis.This study provides insights into the hepatotoxicity mechanisms of ZADC-EA on BRL-3A cells. It was found that ZADC-EA could induce endoplasmic reticulum stress and inhibit autophagy, then intensify apoptosis, and endoplasmic reticulum stress could exacerbate autophagy inhibition.Zanthoxylum armatum DC. (Z. armatum) is an herbal medicine with various active ingredients and pharmacological effects. However, modern studies found that Z. armatum is hepatotoxic. The liver is the target organ for toxic effects and an important site for lipid metabolism. The effects of Z. armatum on lipid level and metabolism in the liver are still unclear.This study aimed to analyze hepatic lipid levels, lipid metabolites and metabolic pathways of action of Z. armatum based on lipidomics, to investigate the potential hepatotoxic mechanism of Z. armatum.Different doses (62, 96, and 150 mg/kg) of the methanolic extract of Z. armatum (MZADC) were administered to ICR mice by gavage. The hepatotoxicity of MZADC was assessed by the liver index, serum biochemical measurements, and histopathological examination. Lipid levels measured by the serum lipid index were evaluated in the mice.
Lipidomics was used to screen for differential lipid metabolism markers and lipid metabolism pathways in the liver. Western blot analysis was performed to investigate the effects of MZADC on the liver.Liver index values and serum alanine transaminase and aspartate transaminase levels were increased in the MZADC group. Histopathology examination revealed hepatocyte necrosis, watery degeneration of the hepatocytes, and hepatic cord rupture in the livers of mice. Serum levels of low-density lipoprotein cholesterol, cholesterol, and triglycerides were elevated, and high-density lipoprotein cholesterol levels were decreased. Lipidomics screening for markers of differential lipid metabolism in the liver, and altered profiles of differential metabolites indicated that glycerophospholipid metabolism, linoleic acid metabolism, alpha-linolenic acid metabolism, glycosylphosphatidylinositol-anchored biosynthesis, sphingolipid metabolism and arachidonic acid metabolic pathways were significantly associated with MZADC-induced liver injury. Western blots confirmed that the protein expression of LC3, Beclin-1, ATG5, ATG12 and ATG16L1 was decreased, and p62 was increased in the MZADC group. The proportion of p-PI3K/PI3K and p-AKT/AKT was increased.The liver injury induced by MZADC involved many different lipid metabolites and lipid metabolic pathways, which may be related to autophagy.
This study provides a new perspective on the hepatotoxicity study of Z. armatum and provides a reference for the safe application of Z. armatum in the medicine and food fields.Zanthoxylum armatum is an evergreen plant with high economical and medicinal values. The presence of prickles on stems and leaves is undesirable for them make picking difficult. To date, little is known of prickle formation in Z. armatum. Herein, the morphological and molecular features of prickle initiation in prickless (WC) and three types of prickly Z. armatum were characterized. Compared to WC, the levels of cytokinin and auxin were increased, while GA and JA declined in prickly Z. armatum.
Transcriptome analysis identified 6258 differentially expressed genes (DEGs) between prickless and prickly Z. armatum. Among them, several DEGs related to hormone metabolism and signaling, including LOG7, CKX3, AHK1, three DELLAs, six JAZs and TIR1, were candidate genes involved in prickle formation. Transcription factors associated with prickle formation were screened, including MYB6-1/MYB6-2, WER, GL3-2, SPL4/5, SOC1, and SCL32. Of them, MYB6-1 and WER might negatively regulate prickles initiation via interacting with GL3-2. Additionally, the histone acetylation and DNA methylation levels, the transcripts of histone acetyltransferase/deacetylase and DNA methyltransferases showed significant differences between prickless and prickly plants, indicating their involvements in prickle initiation. These findings illustrate the regulation of prickle formation might be mediated by phytohormones (especially cytokinin), transcription factors and epigenetic modifications in Z. armatum.Zanthoxylum armatum DC. (ZAD) oil is one of the most popular seasonings for its unique flavor and numbing taste. However, aromatic and pungent components are easily affected by extraction process. In this study, a novel low-temperature continuous phase transition process (CPTP) was applied to extract ZAD oil, and the flavor and quality of oil were compared with the those of products obtained from fried process (FP), fresh squeezed process (FSP) and supercritical carbon dioxide process (SCDP) using Gas Chromatography-Mass Spectrometry/Olfactometry and UPLC-DAD-ESI-Q-TOF-MS/MS. The outcome demonstrated that the oil preserved higher volatile aroma components from SCDP and CPTP (606.073 mg/g and 194.905 mg/g, respectively). It's interesting to note that the majority of the alkyl components were only present in the ZAD oil created using CPTP, which further preserved the original makeup of the fragrance components of ZAD. Four ZAD oil had considerably different pungent compounds, with SCDP having the greatest concentration (16697.78 g/mL), followed by CPTP (6425.66 g/mL), FP (2662.6 g/mL), and FSP (719.69 g/mL). Physicochemical properties analysis indicated that unsaturated fatty acid content was highest for FSP oil (91.97%).
Overall, as a fresh and effective extraction technique, CPTP may be appropriate for the extraction of natural fragrance components.The present study carried out to investigate the bioactive chemical compounds, total polyphenol content and antioxidant potential of different extracts of the Zanthoxylum armatum leaves collected from the Nainital, Uttarakhand. The GC-MS analysis of Z. armtum leaves extract resulted in the isolation of sixty, twelve, twenty-three and nineteen phytochemical constituents in methanol, ethanol, chloroform and water extracts respectively. The leaves extracts were strongly characterised by Heneicosane, Tetratetracontane, Phytol, Fargesin, (+)- Seasmin and Paulowin. Methanol extract showed maximum DPPH (2,2-Di-phenyl-1-picryl-hydrazyl) Free radical scavenging activity (IC 50 15.63 ± 0.31), Ferric Reducing Antioxidant Activity (88.98 ± 3.34 AAE ± SD) and Metal Chelating Activity (IC 50 9.89 ± 0.83). The results showed that the methanolic extract exhibited the highest phenolic content for total phenol content (98.26 ± 0.8 mg of Gallic acid equivalent/g of dry weight), total flavonoid content (61.50 ± 1.62 mg of Quercetin equivalent/g of dry weight) and total tannin content (79.96 ± 0.81 mg of Tannic acid equivalent/g of dry weight).The anti-urease effects of active extract and three isolated phenolic compounds viz., chlorogenic acid, trans-ferulic acid, and gallic acid of leaves of Zanthoxylum armatum DC were evaluated. The compounds were identified based on HPLC-PDA, HR-MS, and NMR analysis. Molecular docking analysis revealed that these compounds significantly interacted with Helicobacter pylori urease and SARS-CoV2 vital proteins. Chlorogenic acid was found to show the strongest interaction with the H.
pylori urease and coronavirus main protease (Mpro, also called 3CLpro), while gallic acid with five spike proteins (Cathepsin L) of SARS-CoV2. The compounds were checked for their drug-likeliness character and were found to pass the Lipinski filter and abide by Veber's rule and passed through ADMET. Chlorogenic acid was simulated for 50 ns using GROMACS. The study shows that chlorogenic acid isolated from Z. armatum could be a significant antagonist of the H. pylori urease.View all citing articles on ScopusView full text© 2018 Elsevier B.V. All rights reserved. 1. Tantapakul C., Phakhodee W., Ritthiwigrom T., Yossathera K., Deachathai S., Laphookhieo S. Antibacterial compounds from Zanthoxylum rhetsa. Arch. Pharm. Res. 2012;35:1139–1142. doi: 10.1007/s12272-012-0703-9. [PubMed] [CrossRef] [Google Scholar]2. Ochwang'I D.O., Kimwele C.N., Oduma J.A., Gathumbi P.K., Mbaria J.M., Kiama S.G. Medicinal plants used in treatment and management of cancer in Kakamega County, Kenya. J. Ethnopharmacol. 2014;151:1040–1055. doi: 10.1016/j.jep.2013.11.051. [PubMed] [CrossRef] [Google Scholar]3. Tankeo S.B., Damen F., Awouafack M.D., Mpetga J., Tane P., Eloff J.N., Kuete V. Antibacterial activities of the methanol extracts, fractions and compounds from Fagara tessmannii. J. Ethnopharmacol. 2015;169:275–279. doi: 10.1016/j.jep.2015.04.041. [PubMed] [CrossRef] [Google Scholar]4. Bunalema L., Obakiro S., Tabuti J.R., Waako P. Knowledge on plants used traditionally in the treatment of tuberculosis in Uganda. J. Ethnopharmacol. 2014;15:999–1004. doi: 10.1016/j.jep.2013.12.020. [PubMed] [CrossRef] [Google Scholar]5. Goodman C.D., Hoang A.T., Diallo D., Malterud K.E., McFadden G.I., Wangensteen H. Anti-plasmodial effects of Zanthoxylum zanthoxyloides. Planta Med. 2019;85:1073–1079. doi: 10.1055/a-0973-0067. [PubMed] [CrossRef] [Google Scholar]6. Groppo M., Pirani J.R. A new species of Zanthoxylum (Rutaceae) with a key to the species from Northeastern Brazil. Phytotaxa. 2017;314:259–265. doi: 10.11646/phytotaxa.314.2.7. [CrossRef] [Google Scholar]7. Mabogo D.E.N. Ph.D. Thesis. University of Pretoria; Pretoria, South Africa: 1990. The Ethnobotany of the Vhavenda. [Google Scholar]8. Asase A., Oppong-Mensah G. Traditional antimalarial phytotherapy remedies in herbal markets in southern Ghana. J. Ethnopharmacol. 2009;126:492–499. doi: 10.1016/j.jep.2009.09.008. [PubMed] [CrossRef] [Google Scholar]9. Massoma L., Gasco M., Rubio J., Yucra S., Sock E.N., Gonzales G.F. Effect of the ethanolic extract from Fagara tessmannii on testicular function, sex reproductive organs and hormonal level in adult male rats. J. Androl. 2011;43:139–144. doi: 10.1111/j.1439-0272.2009.01035.x. [PubMed] [CrossRef] [Google Scholar]10. Phuyal N., Jha P.K., Raturi P.P., Rajbhandary S. Zanthoxylum armatum DC.: Current knowledge, gaps and opportunities in Nepal. J. Ethnopharmacol. 2019;229:326–341. doi: 10.1016/j.jep.2018.08.010. [PubMed] [CrossRef] [Google Scholar]11. Plazas E., Rosana C.R., Monica A.M., Fernando B.C., Cuca L.E. Metabolomic profiling of Zanthoxylum species: Identification of anticholinesterase alkaloids candidates. Phytochemistry. 2019;168:112128. doi: 10.1016/j.phytochem.2019.112128. [PubMed] [CrossRef] [Google Scholar]12. Nurain I.O., Bewaji C.O., Johnson J.S., Davenport R.D., Zhang Y. Potential of three ethnomedicinal plants as antisickling agents. Mol. Pharm. 2017;14:172–182.

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