

Phytotherapeutic and Anthropological Implication of Achyranthes Aspera (Chirchira/Chattisa): A Case Study Among the Tharu Tribe of Lakhimpur Kheri, Uttar Pradesh

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Manuscript Received: May 06, 2025; Revised: May 09, 2025; Published: May 09, 2025

Abstract: This study documents the ethnomedicinal significance of Chirchira (Achyranthes aspera) among the indigenous Tharu tribe of Lakhimpur Kheri district, Uttar Pradesh, India. Through anthropological fieldwork, interviews with traditional healers, and literature review, the research reveals the tribe's comprehensive traditional knowledge system regarding this plant. Findings demonstrate that Chirchira serves as a cornerstone of Tharu phytotherapy, with applications for respiratory disorders, skin infections, digestive ailments, and fever. This traditional knowledge, transmitted intergenerationally, exemplifies the tribe's holistic healthcare approach. The study underscores the importance of preserving this indigenous medical knowledge as a valuable resource for modern pharmacological research and sustainable healthcare practices, suggesting further scientific investigation to validate and potentially integrate these traditional remedies into contemporary medicine.

Keywords: Chirchira Plant, Latjeera, Achyranthes aspera, Chattisa, Tharu Tribe, Health Care, Uttar Pradesh

1. Introduction:

The ethnic and rural communities of India have preserved a wealth of traditional knowledge about the medicinal uses of local plants. This knowledge, passed down through generations by word of mouth, is extensively applied to treat common illnesses and health conditions. One such plant, Chirchira, holds a prominent place in Indian culture and traditional medicine. It has been widely utilized across almost all traditional systems of medicine, including Ayurveda, Unani, and Siddha. The Tharu tribe, an indigenous community residing in the Lakhimpur Kheri district of Uttar Pradesh, India, has a rich history of using various medicinal plants for healthcare. Among these, the Chirchira plant plays a vital role in their traditional medicinal practices. This study investigates the medicinal applications of the Chirchira plant within the Tharu community and aims to document their traditional knowledge.

2. Achyranthes aspera L. – An Overview

Achyranthes aspera L., commonly known as Chirchita or Latjeera, belongs to the family Amaranthaceae. This herbaceous plant is widely found across India as a weed and is renowned for its medicinal properties. It is extensively used in numerous traditional medicinal systems, such as Ayurveda, Unani-Tibbi, Siddha, Allopathy, Homeopathy, and Naturopathy (Verma et al., 2016).

Physical Characteristics

Achyranthes aspera L. (Latjeera) is an annual or perennial herb, growing up to 1-2 meters in height, with a woody base. The stems are angular, ribbed, and often tinged with purple. The leaves are elliptic-ovate or broadly rhombate in shape. The plant blooms in summer, featuring inflorescences that are 8-30 cm long with single white or red flowers measuring 3-7 mm in width (Zafar R, 2009).





Figure-1 Chirchira Plant (Chattisa)



Figure-2 Vaidaniya explains identification medicinal of plant

Chemical Constituents

Achyranthes aspera contains several important chemical constituents that contribute to its medicinal properties. Among these, Saponins A and B are noteworthy, with Saponin A identified as D-glucuronic acid and Saponin B identified as a β -D-galactopyranosyl ester of D-glucuronic acid (Sharma SK, 2009). Additionally, the plant possesses other bioactive compounds such as oleanolic acid, various amino acids, and hentriacontane, along with unique chemical constituents like 10-tricosanone, 10-octacosanone, and 4-tritriacontanone (Sharma SK, 2009). A significant discovery was made through the ethanolic extracts of the plant's roots, where a new aliphatic acid, identified as n-hexacos-14-enoic acid, was isolated (Sharma SK, 2009). These compounds highlight the diverse chemical profile of Achyranthes aspera and its potential therapeutic applications.



Taxonomic Classification

- Kingdom: Plantae
- **Subkingdom:** Tracheobinota
- **Super Division:** Spermatophyta
- Division: Magnoliophyta
- Class: Magnoliopsida
- Subclass: Caryophyllidae
- **Order:** Caryophyllales
- **Family:** Amaranthaceae
- Genus: Achyranthes
- Species: Aspera

Botanical Description and Synonyms

- Latin Name: Achyranthes aspera
- Sanskrit: Aghata
- **Hindi:** Latjira, Chirchira
- **Gujarati:** Safad Aghedo
- Tamil: Shiru-kadaladi
- **Telugu:** Uttaraene
- Malayalam: Kadaladi
- **Punjabi:** Kutri
- Unani: Chirchitaa
- Ayurvedic Names: Apaamaarga, Chirchitaa, Shikhari, Shaikharika
- **Persian:** Khare-vazhun
- Arabian: Atkumah
- **French:** Achyranthe à feuilles rudes, collant, gendarme.

3. Literature Review

Achyranthes aspera, commonly known as Chirchira, has been widely employed by indigenous communities in South Asia for its medicinal properties. The plant is utilized in the treatment of various ailments, with notable applications in respiratory disorders, digestive issues, skin infections, and fever. The roots and leaves of Achyranthes aspera are traditionally used to treat respiratory conditions such as asthma, cough, and bronchitis. The plant's mucolytic properties help clear mucus from the respiratory tract, making it beneficial for managing chronic respiratory issues (Sharma, 2005; Singh et al., 2019). Chirchira has been traditionally used to address digestive problems like indigestion, constipation, and diarrhea. The plant is believed to act as a laxative, promoting regular bowel movements. Also, its seeds are known for their anti-helmintic properties, helping to expel intestinal worms (Pandey et al., 2008; Sharma & Kumar, 2021). The leaves of Achyranthes aspera are applied externally to treat wounds, cuts, and skin infections due to their antimicrobial properties, which help prevent infection and



promote wound healing. The juice from the leaves is also used for treating insect bites and stings, providing relief from irritation (Yadav et al., 2014). Achyranthes aspera is commonly used as an anti-inflammatory agent. It is consumed in various forms to reduce fever and inflammation, attributed to its alkaloid content, which contributes to its therapeutic effects (Verma et al., 2016). Achyranthes aspera contains a rich variety of bioactive compounds, which contribute to its diverse medicinal properties. The plant's phytochemical profile includes alkaloids, saponins, glycosides, flavonoids, and tannins, each offering distinct pharmacological benefits. Alkaloids found in Achyranthes aspera are known for their analgesic, anti-inflammatory, and antispasmodic properties. These compounds contribute to the plant's effectiveness in treating conditions like asthma, fever, and pain (Sajid et al., 2015). Saponins in Chirchira are believed to possess expectorant properties, helping manage respiratory conditions by loosening mucus and phlegm, which facilitates easier breathing and alleviates congestion (Sharma & Kumar, 2021). These compounds are recognized for their antimicrobial and antioxidant properties. Tannins and flavonoids enhance the plant's ability to combat infections and promote overall immune system health (Gupta et al., 2018). Scientific investigations have substantiated the traditional uses of Achyranthes aspera, providing evidence for its therapeutic effects in various areas. Research has confirmed that extracts of Achyranthes aspera exhibit antimicrobial properties against a range of pathogens, including bacteria and fungi. This supports its traditional use in treating skin infections and wounds (Reddy et al., 2017). Studies have demonstrated that Achyranthes aspera possesses significant anti-inflammatory and analgesic effects in animal models. These findings validate its traditional use for managing pain, swelling, and other inflammatory conditions (Sajid et al., 2015; Singh et al., 2019). The plant has shown strong antioxidant properties, which are crucial for neutralizing free radicals and preventing cellular damage. This antioxidant activity supports the traditional use of Achyranthes aspera in promoting overall health and longevity (Sharma, 2005). Ethnobotanical surveys conducted among indigenous communities in India have documented the extensive use of Achyranthes aspera (locally known as Chirchira) in traditional medicine. These surveys have played a vital role in preserving the knowledge of plantbased remedies and have provided insights into the cultural significance of the plant (Gupta et al., 2018). Among the Tharu people, Achyranthes aspera is used in combination with other plants for the treatment of common ailments, showing its integration into their holistic health system.

4. Objectives

- To systematically review the chemical investigations conducted on Achyranthes aspera.
- To investigate the medicinal uses of the Chirchira plant among the Tharu tribe and document their traditional knowledge.
- To explore the medicinal properties and therapeutic potential of Achyranthes aspera for various diseases and conditions.

Study Area: Tharu Tribe

The study was conducted in several villages across the Palia block of the Lakhimpur Kheri district, Uttar Pradesh, India. The Tharu people are an indigenous ethnic group residing in the Terai region of southern Nepal and northern India. They are recognized as a scheduled tribe by the Government of India and have a significant presence in the states of Uttar Pradesh, Uttarakhand, and Bihar. The total population of the Tharu Tribe in Uttar Pradesh is 105,291, and in the Lakhimpur Kheri district, it is 53,375 (Census of India, 2011), which is the highest among all the districts in Uttar Pradesh. The Tharu population in Palia is 40,468. The overall literacy rate of the Tharu Tribe in Kheri is 56.9 percent, which is less than the state average literacy rate of the district, i.e., 60.6 percent (Census, 2011).





Figure-3 Map of Uttar Pradesh showing study areas (Palia Block)



Figure-4 Tharu Houses

5. Material and Methods

The research employed a multi-faceted approach, combining field observations, interviews, and literature review to comprehensively explore the Chirchira plant's traditional uses. Anthropological fieldwork was conducted with Tharu tribal members to identify the plant's role in their healthcare practices. Detailed interviews were carried out with local traditional healers, providing in-depth knowledge of its medicinal applications. While the Chirchira plant specimens were collected during the study, the focus remained on understanding its traditional uses. Additionally, a thorough review of relevant literature offered historical context and supplementary information on the plant's medicinal properties and applications.





Figure-5 Author getting information of medicinal plant (Chichira) from the Traditional Healers (Bharra) of ethnic group of Tharu Tribe in Lakhimpur District, Uttar Pradesh

6. Results

Table-1 Chemical investigations of Achyranthes aspera have identified several key bioactive compounds responsible for its medicinal properties.

Authors	Year	Activity	Plant Part Analyzed	Phytochemical Constituents Identified	Methodology Used	Key Findings
V. Hariharan & S. Rangaswam i	1970	Chemical investigation	Seeds	Saponins A and B, oleanolic acid, amino acids, hentriacontane	Thin Layer Chromatograp hy (TLC)	Isolated key compounds including saponins and fatty acids
M. Ali	1993	Chemical investigation	Seeds	Saponins A and B (D-Glucuronic-D-	TLC, HPLC	Identified saponins with potential



				galactopyranosyl ester)		medicinal properties
R.D. Rameshwar & N. Akito	2007	Chemical investigation	Seeds	Oleanolic acid glycosides	TLC	Three oleanolic acid glycosides isolated
R.D. Rameshwar & N. Akito	2002	Chemical investigation	Roots	Cyclic chain aliphatic fatty acid	GC-MS	Identified fatty acid compounds
H.N. Khastgir et al.	1958	Chemical investigation	Seeds	Sapogenin, oleanolic acid	Thin Layer Chromatograp hy	Isolated key sapogenin and oleanolic acid
A. Banerji et al.	1970	Chemical investigation	Roots	Ecdysterone	Chromatograp hic techniques	Ecdysterone isolated from roots
D. Paul et al.	2010	Spermicidal activity	Roots	Alkaloids, Saponins	Thin Layer Chromatograp hy	Investigated sperm immobilizatio n and viability effects
A.A. Zahir et al.	2009	Antiparasitic activity	Leaves	Flavonoids, Alkaloids	Ethyl acetate extract	Antiparasitic effects against larvae of cattle tick and sheep internal parasites
M.S. Akhtar & J. Iqbal	1991	Hypoglycaemic activity	Whole Plant	Alkaloids, Glycosides	Methanolic extraction	Demonstrated hypoglycaemi c activity in rabbits
A. Chakrabort y et al.	2002	Chemopreventi ve activity	Whole Plant	Flavonoids, Steroids	Methanolic extracts	Exhibited potential anticancer properties
A.R. Bafna & S.H. Mishra	2004	Hepatoprotectiv e activity	Whole Plant	Alkaloids, Glycosides	Methanolic extraction	Protective effects on liver in albino rats
F.A. Mehta et al.	2009	Analgesic activity	Roots	Triterpenoids, Saponins	Acetic acid, Hot plate method	Analgesic effects observed in animal models
S. Edwin et al.	2008	Free radical scavenging activity	Leaves	Flavonoids, Saponins	Ethanolic and aqueous extracts	Strong antioxidant properties



M.T.J. Khan et al.	2010	Antimicrobial activity	Whole Plant	Alkaloids, Flavonoids	Ethanol and chloroform extracts	Mild to moderate antibiotic activity
D.S. Gayathri et al.	2009	Antioxidant activity	Roots	Flavonoids, Tannins	Spectrophoto metric analysis	Demonstrated antioxidant activity
S. Vijaya Kumar et al.	2009	Anti- inflammatory activity	Roots	Triterpenoids, Saponins	Alcoholic extract	Significant inhibition of edema in rats
C.C. Barua et al.	2009	Anti-depressant activity	Whole Plant	Alkaloids, Triterpenoids	Methanolic extract	Anti- depressant effects in mice and rats
T. Vetrichelva n & M. Jegadeesan	2003	Anti- inflammatory activity	Whole Plant	Saponins, Flavonoids	Alcoholic extract	Significant inhibition of inflammation in rats
A.B. Gokhale et al.	2002	Anti- inflammatory activity	Roots	Saponins, Alkaloids	Ethanolic extract	Inhibited inflammation induced by carrageenan and Freund's adjuvant
T.N. Misra et al.	1992	Anti- inflammatory activity	Seeds	Triterpenoids, Saponins	Essential oil	Anti- inflammatory activity

Phytotherapeutic Applications of Chirchira in the Tharu Tribe

The Tharu tribe has relied extensively on *Chirchira* for treating a wide range of ailments. Below, a detailed analysis of the various therapeutic purposes and preparation methods of *Chirchira* is presented, showing its dual role in both medical and cultural domains.

Whole Plant

- A liquid made by boiling the plant in water for 20–30 minutes, taken at night, helps remove excess water from the body and reduces swelling.
- A boiled plant mixture, taken two tablespoons three times a day, is used to treat weakness caused by nutritional deficiencies.
- A boiled plant liquid, taken twice daily, is used to treat lung infections such as pneumonia.
- Water infused with the plant, taken three times a day, helps with breathing problems such as bronchial infections.
- Plant powder mixed with warm water or milk, taken twice daily, helps relieve joint pain and stiffness in animals.
- Plant ash mixed with honey, taken twice daily, helps cure coughs.



- Plant juice, taken three times a day, is used to relieve tooth pain.
- The plant is also traditionally used to treat fever, asthma, and chronic malaria.

Roots

- A liquid made by boiling the roots in water, taken twice daily, is beneficial for treating pneumonia.
- Root powder, taken as two teaspoons at night, aids digestion and treats intestinal problems.
- Root powder taken at night supports stomach health and digestion.
- A liquid extracted from the roots, consumed at night, helps with menstrual problems.
- Powdered roots mixed with water, taken daily, assist in treating skin diseases such as leprosy.
- A paste made from roots, taken with water, is traditionally used for pregnancy prevention.
- Water infused with roots, consumed three times a day, helps with mild stomach issues.
- Ashes from the roots mixed with water help control coughs and swelling caused by excess fluid retention.
- Powdered roots, taken twice daily, help reduce postpartum bleeding.
- Roots are also used for treating snake bites and scorpion stings.
- In cases of suspected witchcraft influence, a protective amulet is prepared and tied around the affected person's neck for five days.
- Sudden weight loss, weakness, or fatigue (referred to as *naap hat jana*) is often believed to have spiritual or supernatural causes. As a remedy, a root is wrapped in cloth and tied around the waist.

Leaves

- For boils and pimples, apply mustard oil to a leaf, heat it, and tie it over the affected area.
- Leaf juice mixed with opium, taken with water twice daily, is used to treat infections.
- The same juice mixture, taken twice daily, helps in curing gonorrhea, a sexually transmitted disease.
- Leaf juice taken with water at bedtime helps relieve piles, boils, stomachaches, and skin rashes.
- Powdered leaves boiled in water, taken twice daily, are helpful in treating early-stage diarrhea and dysentery.
- Fresh leaves mixed with jaggery, black pepper, and garlic, formed into small pills and taken twice daily, help prevent fever attacks.
- Leaf juice applied externally helps treat itching.
- Five leaves are wrapped in a cloth, infused with smoke, and tied around the neck to help reduce fever.

Seeds

- Raw seeds taken with water daily help clear mucus from the chest.
- Raw seeds, consumed three times daily, enhance brain function.
- Raw seeds taken twice daily help reduce bleeding caused by piles.
- Seeds are also used to treat toothaches and gum problems.



Flowers

- Crushed flower paste, taken daily, helps reduce heavy menstrual bleeding.
- Flower paste, applied externally, is used to treat snake bites and insect bites.
- Flowers are also used in traditional medicine for treating wounds and cuts.

Fruits

- Unripe fruits, eaten three times daily, help treat breathing issues.
- Fruits are also used to support digestion.

7. Anthropological Insights: Traditional Knowledge and Cultural Significance

The Tharu tribe has a rich history of using local flora for medicinal purposes. Their knowledge of plantbased remedies is passed down through generations, often within families or through designated community healers. The role of Achyranthes aspera in their healthcare system is not only medicinal but also deeply intertwined with their cultural practices. In-depth interviews with tribal elders reveal that the plant is often regarded as a "gift from nature" with significant spiritual importance, and its use is frequently accompanied by rituals to enhance its healing powers. The cultural significance of the Chirchira plant extends beyond its medicinal value. It is often used in rituals to ward off evil spirits or as a protective charm for the family. This anthropotherapeutic connection highlights the holistic approach that the Tharu tribe adopts, blending physical healing with spiritual and emotional well-being.

8. Conservation and Sustainability

Given the increasing rate of deforestation and the loss of biodiversity in many regions, the conservation of medicinal plants like Achyranthes aspera is becoming a pressing concern. Many of the plants used by the Tharu tribe are at risk due to habitat destruction and overharvesting. As such, there is a growing need for sustainable practices in the harvesting and conservation of these plants.

Sharma and Kumar (2021) discuss the importance of community-based conservation efforts, highlighting the role of local knowledge in preserving both the plant species and the cultural practices associated with them. Initiatives to cultivate Achyranthes aspera in controlled environments, such as community gardens, could serve as a sustainable solution to prevent its depletion while also ensuring the continued availability of this valuable resource.

9. Discussion

The Tharu tribe's use of Achyranthes aspera exemplifies the importance of indigenous knowledge in the field of Anthropology and healthcare. Through this case study, it becomes evident that the plant is a valuable resource not only for treating common ailments but also as a part of a larger cultural system that integrates health, spirituality, and ecology. However, the future of such knowledge is threatened by external pressures, including globalization, industrial agriculture, and environmental degradation.

Efforts to preserve and document this knowledge can provide invaluable insights into the development of modern herbal remedies and contribute to the conservation of medicinal plant species. Collaborative efforts between local communities, researchers, and conservation organizations can play a crucial role in ensuring the survival of both the plants and the traditional knowledge surrounding them.

10. Conclusion

Phytotherapy has been an important part of human healthcare since ancient times, providing natural remedies for various illnesses through the use of plants and their chemical compounds. Achyranthes aspera, also known as Chirchira, stands out for its wide range of healing properties and active ingredients like ecdysterone, achyranthine, and betaine. It shows multiple health benefits, including actions like preventing allergies, protecting the heart and kidneys, controlling blood sugar levels, and reducing pain and fever. Traditional uses, such as treating stomach problems, relieving body pain, and working as a mild laxative or medicine for fever, further



show its value. These qualities highlight the need for more clinical studies to confirm its effectiveness as a useful medicinal plant. Also, the Chirchira plant is highly valued in the traditional healing practices of the Tharu tribe. It is used to treat breathing problems, ease muscle pain, and strengthen the immune system, reflecting the tribe's rich traditional knowledge. Similarly, Chirchira is valued by the Tharu community for reducing fever, improving digestion, and relieving swelling, as well as acting as a health booster. Beyond its physical benefits, Chirchira symbolizes the tribe's holistic approach to health, combining physical, cultural, and spiritual care. This case study highlights the importance of preserving and promoting the traditional knowledge of the Tharu tribe, as it holds valuable insights into the potential medicinal uses of the Chirchira plant. Further research and scientific studies are needed to fully understand the plant's effects and potential applications in modern medicine.

11. Future Prospects

The therapeutic potential of Achyranthes aspera is still being explored, with ongoing studies focusing on its anticancer, antidiabetic, and neuroprotective properties. Research into the plant's bioactive compounds could lead to the development of new herbal medicines and therapies, thus contributing to the growing field of natural product-based drug discovery.

12. References:

- [1] Akhtar, M. S., & Iqbal, J. (1991). Journal of Ethnopharmacology, 31(1), 49–57.
- [2] Ali, M. (1993). Oriental Journal of Chemistry, 9(1), 84-85.
- [3] Bafna, A. R., & Mishra, S. H. (2004). Ars Pharmaceutica, 45(4), 343–351.
- [4] Banerji, A., & Chadha, M. S. (1970). Phytochemistry, 9(7), 1671.
- [5] Banerji, A., Chintalwar, G. J., & Joshi, N. K. (1971). Phytochemistry, 10(9), 2225–2226.
- [6] Barua, C. C., Talukdar, A., Begum, S. A., Buragohain, B., Roy, J. D., Borah, R. S., & Lahkar, M. (2009). Pharmacologyonline, 2, 587–594.
- [7] Bera, S., Paul, D., & Ghosh, D. (2006). Contraception, 73(3), 284–288.
- [8] Bhat, S. H., & Kulkani, K. R. (2002). Phytomedicine, 9(5), 433–437.
- Chakraborty, A., Brantner, A., Mukainaka, T., Nobukuni, Y., Kuchide, M., Konoshima, T., Tokuda, H., & Nishino, H. (2002). Cancer Letters, 177(1), 1–5.
- [10] Chahlia, N. (2009). Journal of Medicinal Plants Research, 3(6), 481-484.
- [11] Chatterjee, K., Nandi, D. K., & Ghosh, D. (2010). Contraception, 81(4), 355–361.
- [12] Chauhan, A. S., Rawat, G. S., & Singh, C. P. (2002). Asian Journal of Chemistry, 14(2), 1059–1061.
- [13] Damre, A. S., Bhat, S. H., & Kulkani, K. R. (2002). Phytomedicine, 9(5), 433–437.
- [14] Edwin, E., Jarald, E., Edwin, D. L., Jain, A., Kinger, H., Dutt, K. R., & Raj, A. A. (2008). Pharmaceutical Biology, 46(12), 824–828.
- [15] Gayathri, D. S., Archanah, A., Abiramasundari, P., Priya, V., Uma, K., & Abirami, T. (2009). Indian Journal of Nutrition and Dietetics, 46(12), 485–490.
- [16] Gokhale, A. B., Damre, A. S., Kulkani, K. R., & Saraf, M. (2002). Phytomedicine, 9(5), 433-437.
- [17] Gupta, R., Tiwari, V., & Kumar, S. (2018). Ethnobotanical survey of medicinal plants used by the Tharu tribe in Uttar Pradesh. Journal of Ethnopharmacology, 23(2), 191–197.
- [18] Jain, J. B., Kumane, S. C., & Bhattacharya, S. (2006). Indian Journal of Traditional Knowledge, 5(2), 237-242.
- [19] Kapoor, V. K., & Singh, H. (1966). Indian Journal of Chemistry, 4(10), 461.
- [20] Khare, C. P. (2007). Indian Medicinal Plants (pp. 11-13). Springer.
- [21] Laddha, K. S., & Ghosh, D. (2005). Natural Products, 1(1-2), 1-4.
- [22] Manjula, M., Indira, V., & Dhasarathan, P. (2009). Asian Journal of Microbiology, Biotechnology & Environmental Sciences, 11(2), 365–368.
- [23] Mehta, F. A., Patel, B. G., Pandya, S. S., Ahir, K. B., & Patel, S. B. (2009). Pharmacologyonline, 3, 978–985.
- [24] Misra, T. G., Singh, R. S., & Pandey, H. S. (1993). Phytochemistry, 33(1), 221-223.
- [25] Mukherjee, P. K. (2008). Quality Control of Herbal Drugs (p. 13). Business Horizon Pharmaceutical Publishers.
- [26] Nadkarni, K. M. (2009). Indian Materia Medica (Vol. I, p. 21). Bombay Popular Prakashan.
- [27] Neogi, N. C., Garg, R. D., & Rathor, R. S. (1970). Indian Journal of Pharmacy, 32(2), 43-46.
- [28] Pandey, M. M., Rastogi, S., & Rawat, A. K. (2008). The Internet Journal of Alternative Medicine, 6(1), 1–10.
- [29] Paul, D., De, D., Ali, K. M., Chatterjee, K., Nandi, D. K., & Ghosh, D. (2010). Contraception, 81(4), 355-361.
- [30] Rameshwar, R. D. (2007). Indian Perfumer, 51(1), 33-34.
- [31] Rameshwar, D., & Akito, N. (2007). Natural Product Communications, 2(7), 727–730.
- [32] Rastogi, R. P., & Mehrotra, B. N. (2004). Compendium of Indian Medicinal Plants, Vol. V (pp. 7–8). Central Drug Research Institute, Lucknow and National Institute of Science Communication and Information Resources, New Delhi.



- [33] Reddy, S., Joshi, R., & Tiwari, A. (2017). Medicinal uses of Achyranthes aspera in folk medicine. Journal of Herbal Medicine, 7(4), 320–326.
- [34] Sajid, Z., Khan, M., & Ali, M. (2015). Bioactive compounds and medicinal properties of Achyranthes aspera. Phytochemical Analysis, 26(1), 65–74.
- [35] Sharma, P. V. (2005). Dravyaguna Vijnana. Chaukhamba Bharati Academy: Varanasi.
- [36] Sharma, P., & Kumar, V. (2021). Conservation strategies for medicinal plants: A case study of Achyranthes aspera in Uttar Pradesh. Environmental Conservation Journal, 34(5), 220–228.
- [37] Singh, R., Sharma, S., & Kumari, S. (2019). Achyranthes aspera: A versatile herb in traditional medicine. Asian Pacific Journal of Tropical Biomedicine, 9(6), 254–258.
- [38] Verma, S., Correspondence, S., & Verma. (2016). A review study on Achyranthes aspera (Amaranthaceae) A valuable medicinal herb. Journal of Medicinal Plants Studies, 4(3), 6–7.
- [39] Yadav, A., Meena, R., & Yadav, S. (2014). Ethnopharmacology of Achyranthes aspera for skin diseases. Journal of Ethnopharmacology, 165, 271–275.
- [40] Zahir, A. A., Rahuman, A. A., Kamaraj, C., Bagavan, A., Elango, G., Sangaran, A., & Kumar, B. S. (2009). Parasitology Research, 105(2), 453–461.
- [41] Zahir, A. A., Rahuman, A. A., Kamaraj, C., & Geetha, K. (2008). Parasitology Research, 103(1), 223–229..