

## REVIEW OF *ACHYRANTHES ASPERA* L

*\*Pingale Shirish Sadashiv, # Avvaru Radha Krishna*

*\*PG Department of Chemistry, Gramonnati Mandal's Arts, Com. and Science College, Narayangaon, Pune, (Affiliated to University of Pune) Pin - 410 504, Maharashtra, India.*

*#Shri Jagdishprasad Jhabarmal Tibrewala, University, Vidyanagari, Jhunjhunu, Rajasthan, India*

### ABSTRACT

*Achyranthes aspera is a common plant found throughout India this review focuses on the wide pharmacological activities of Achyranthes aspera L. Before the introduction of modern medicines, disease treatment was entirely managed by herbal remedies. It is estimated that about 80% of the world population residing in the vast rural areas of the developing and under developed countries still depends mainly on medicinal plants. It is quite obvious that the plant is widely used in traditional medicinal system of India and has been reported to possess hepatoprotective, anti-inflammatory, antitussive, antifungal and also used to check wounds healing and antibacterial properties. Achyranthes aspera is a very important plant for its large number of medicinal properties as well as medicinally important chemicals like ecdysterone, achyranthine, betaine, p entatriaontane, 6-pentatriacontanone, hexatriacontane and tritriacontane. The plant shows many pharmacological activities like spermicidal, anti-allergic, cardiovascular, nephroprotective, antiparasitic, hypoglycaemic, analgesic and antipyretic. Many traditional uses are also reported like antiperiodic, purgative and laxative, in various types of gastric disorders and in body pain which are being studied till today and further research has to be done.*

**Keywords:** *Achyranthes aspera L, pharmacological activity, eugenol.*

### INTRODUCTION

According to World Health Organization, medicinal plants are the best source to obtain a variety of newer herbal drugs<sup>1</sup>. About 80% of individuals from developed countries use traditional medicine, which has compounds derived from medicinal plants. Therefore, such plants should be investigated to better understand their properties, safety and efficacy.

The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments<sup>2,3</sup>. In the last few years, a number of studies have been conducted in different countries to prove such efficiency. Many plants have been used because of their antimicrobial traits, which are chiefly due to synthesized during secondary metabolism of the plant.

**BOTANICAL DESCRIPTION:****Family:** Amaranthaceae**Common names:**

1. devil's horsewhip (Source: World Weeds ) – English
2. tu niu xi (Source: F China Eng ) – Transcribed Chinese

**Synonyms:**

1. *Achyranthes argentea* Lam. [*Achyranthes aspera* L var. *sicula*]
2. *Achyranthes aspera* L var. *indica* L. [*Achyranthes aspera* L var. *aspera*]
3. *Achyranthes aspera* L var. *obtusifolia* (Lam.) Suss. [*Achyranthes aspera* L var. *aspera*]
4. *Achyranthes indica* (L.) Mill. [= *Achyranthes aspera* L var. *aspera*]
5. *Achyranthes obtusifolia* Lam. [= *Achyranthes aspera* L var. *aspera*]

**Sanskrit:** Adhahsalya, Adhoghanta, Adhvasalya, Aghamargava, Aghata, Apamarga, Apamargah, Apamargaha, Apangakpushpi, Chamatkarā, Dhamargava, Durabhigraha, Durgraha, Kantarika, Kanti, Karkatapippali, Katalati, Katumanjirika, Kharamanjari, Kini, Kinit, Kishaparni, Ksharamadhya, Kshuraka, Kubja, Malakanta, Markati, Mayura, Mayuraka, Pandukantaka, Parakpushpi, Pratyakparni, Pratyakpuspa, Pratyakpuspi, Shaikharika, Shkhari, Sikhari, Sthalamanjari, Talakata, Vasira

**Hindi:** Apang, Chirchira, Chirchitta, Cicimda, Circita, Latjira, Puthkunda, Chichra, Andhijalo, Katio bhuratio, Undo kanto, Untaghada, Latjiri, Lichkuri, Putkanda, Puthkanda, Puthkanda, Khara, Dintara, Kanti, Kantta, Undhokanto, Appamarg, Andhijhara, Snapamargh, Ultokure

**Urdu:** Charchatta, Rakhchirchitta

**Marathi:** Aghada, Pandhara-aghada, Aghara, Surat, Aghadha, Aghaada, Aghado

**Bengali:** Apang, Apamarga

**Kannada:** Utrani-gida, Utranigida, Uttarane, Uttrane, Uttaraane, Uttaraani gida, Uttaraani, Uttaraani, Uttaraane, Kempuuthraani, Mayoora

**Malayalam:** Cadelari, Kadaladi, Katalati, Valiyakatalati, Vankatalati

**Telgu:** Antisha, Apamargamu, Pratyukpushpi, Utta-reni, Uttaraene, Uttareni, Antisa, Uttaren, Apamaargamu, Utthareni, Dubbinachettu

**Tamil:** Na-yurivi, Nayuruvi, Sirukadaladi, Nayurvi, Civantanayuruvi, Cennayuruvi, Naayurivi, Nayurivi, Nayuviri, Shiru-kadaladi, Nahiooroovievayr, Katalati, Naayuruvi, Akatam, Akatamonniceti, Akatturam.

**DISTRIBUTIONAL RANGE:**

**Africa:** Northern Africa: Algeria [tropical & subtropical]; Egypt; Morocco; Tunisia  
Northeast Tropical Africa: Sudan East Tropical Africa: Kenya; Tanzania; Uganda  
West-Central Tropical Africa: Cameroon West Tropical Africa: Cote d'Ivoire;  
Nigeria; Senegal; Sierra Leone

**Asia-Temperate:** Western Asia: Afghanistan; Iran; Jordan; Lebanon; Syria China: China -  
Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan,  
Yunnan, Zhejiang Eastern Asia: Taiwan

**Asia-Tropical:** Indian Subcontinent: Bhutan; India; Nepal; Pakistan; Sri Lanka Indo-China:  
Cambodia; Laos; Myanmar; Thailand; Vietnam Malaysia: Indonesia; Malaysia

**Australia:** Australia - New South Wales, Northern Territory, Queensland, Western  
Australia

**Europe:** South-eastern Europe: Italy [incl. Sardinia, Sicily] South-western Europe: Spain

**Southern America:** Mesoamerica: Costa Rica; El Salvador; Guatemala; Honduras;  
Mexico - Chiapas, Quintana Roo; Nicaragua Caribbean: Barbados; Dominica;  
Grenada; St. Lucia; St. Vincent and Grenadines Northern South America: French  
Guiana; Guyana; Suriname, Western South America: Bolivia [tropical &  
subtropical]; Colombia; Ecuador; Peru.

**GEOGRAPHICAL SOURCE:**

Easily found anywhere in India on road sides, on the edges of field and waste places as a weed throughout up to an altitude of 2100 m and also in South Andaman Islands<sup>4,5</sup>. Some other places in the world where we can found this plant are in Baluchistan, Ceylon, Tropical Asia, Africa, Australia and America.

**MORPHOLOGY**

*Achyranthes aspera* L locally is one of the most important traditionally used anti-fertility plants in the indigenous health care delivery system of Ethiopia. It is a stiff erect perennial herb of 1 to 3 feet with simple elliptic leaves. The extracts of leaves, roots, and seeds of the plant have been used for control of fertility, in placental retention, and in postpartum bleeding. The preliminary study on leaves extract of the plant had shown some anti-fertility effect. Flowering time of this plant is in summer. The stems are square, leaves elliptic ovate or broadly rhombate. The inflorescences are 8 - 30 cm long, with many single, white or red flowers, 3 - 7mm wide<sup>6,7</sup>. The plant is widespread in the world as a weed, in Baluchistan, Ceylon, Tropical Asia, Africa, Australia and America. In the northern part of India it is known as a medicinal plant in different systems of folk medicine. *Achyranthes aspera* L, a stiff erect herb, has been reported to possess medicinal properties<sup>8</sup>.

## PHYTOCHEMISTRY

The seeds of *Achyranthes aspera* shows presence of Saponins A and B which can also be isolated and identified<sup>9,10</sup>. The D-Glucuronic Acid in Saponin A and D-galactopyranosyl ester in saponins B was isolated from the seeds. Some other acids like oleanolic acid, amino acids were also isolated from *Achyranthes aspera*<sup>11</sup>. A new cyclic chain aliphatic fatty acid was isolated from the seeds of *Achyranthes aspera* by A.S. Chauhan<sup>12</sup> (2002).

Dihydroxy compounds like dihydroxy ketones from the shoots as dihydroxy henpentacontan-4-one and Triacontanol was isolated by A.K. Batta and S. Rangaswami<sup>13</sup> (1973). A water soluble alkaloid betaine (C<sub>5</sub>H<sub>11</sub>NO<sub>2</sub>) with m.p. 292°C was isolated and confirmed by mixed m.p. detection of the HCl-salt by comparing it with other derivatives (oxalate & picrate) authentic sample by V. K. Kapoor and H. Singh<sup>6,14</sup> (1966). There are seven compounds was isolated and identified from *Achyranthes aspera* L leaves like p-benzoquinone, hydroquinone, spathulenol, nerol, ionone, asarone and eugenol constituting 63.05% of the oil, by R.D. Rameshwar<sup>15</sup> (2007).

## PHARMACOLOGICAL ACTIVITY

### Cancer Chemo preventive Activity

The cancer chemo preventive activity study on Epstein- Barr virus early antigen activation induced by tumor promoter 12-O-tetradecanoylphorbol-13-acetate in Raji cells was studied by A. Chakraborty et al. (2002) by using methanolic extracts of leaves, alkaloid, non-alkaloid and saponin fractions<sup>16</sup>.

### Hepatoprotective Activity

Hepatoprotective activity on rifampicin induced hepatotoxicity in albino rats was studied by using methanolic extract of the aerial parts of *Achyranthes aspera*. The above study done by A.R. Bafna and S.H. Mishra<sup>17</sup> (2004).

### Nephroprotective Activity

The whole plant methanolic extract of *Achyranthes aspera* L finds nephroprotective activity and which was studied lead acetate induced nephrotoxicity in male albino rats by T. Jayakumar<sup>18</sup> (2009).

### Anti-oxidant Activity

Anti-oxidant activity of *Achyranthes aspera* L leaves extracts was reported by P. Tahiliani and A. Kar<sup>19</sup> (2000) and the same was reported on leaves and roots by D.S. Gayathri<sup>20</sup> (2009). The anti-oxidant activity of *Achyranthes aspera* L seeds was studied by T. Malarvili and N. Gomathi<sup>21</sup> (2009). The plant exhibited good antioxidant activity which was studied and reported by S. Edwin<sup>22</sup> (2008).

### **Anti-amoebic and Anti-fertility activity**

The juice of plant is used to treat ophthalmic and dysentery, Root paste is taken internally with buttermilk as an antifertility drug, the decoction fresh root is introduced in to the vagina to terminal pregnancy<sup>10</sup>. The ethanol extract of the roots possesses spermicidal activity<sup>23</sup>.

### **Anti-tumor activity**

Particularly methanol extract of the leaves of *Achyranthes aspera* has antitumor activity<sup>24</sup>.

### **Miscellaneous Pharmacological Activity of A. Aspera**

*Achyranthes aspera* L, a traditional medicinal plant used as a healers for the treatment of fever, particularly malarial fever, asthma, hypertension, diabetes and dysentery<sup>25</sup>. Many more aliphatic compounds have been reported from the seeds and the shoots of *Achyranthes aspera*<sup>26,27</sup>. Hypoglycemic thyroid stimulating and antiperoxidative properties was observed from the leaf extractions of *Achyranthes aspera*<sup>28</sup>.

### **DETERMINATION OF HEAVY METALS IN MEDICINAL PLANTS**

Pb, Cr, Fe, and Zn were detected from the parts of medicinal plant like roots, stems, leaves, and seeds by absorption spectrophotometry<sup>29</sup>.

### **CONCLUSION**

*Achyranthes aspera* L. is a commonly occurring plant known as "Prickly chaff flower" in English. The plant is highly esteemed by traditional healers and used in treatment of asthma, bleeding, in facilitating delivery, boils, bronchitis, cold, cough, colic, debility, dropsy, dog bite, dysentery, ear complications, headache, leucoderma, pneumonia, renal complications, scorpion bite, snake bite and skin diseases etc.. Traditional healers claim that addition of *Achyranthes aspera* would enhance the efficacy of any drug of plant origin therefore its use in the treatment of different type of acute and chronic diseases. Whole plants of *Achyranthes aspera* L have pharmacological activity. This plant shows presence of saponins, glucuronic acid, olenilic acid, amino acids, aliphatic fatty acids, dihydroxy ketones and its derivatives, beta, p-benzoquinone, hydroquinone, spathulenol, nerol, -ionone, asarone and eugenol.

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## REFERENCES

1. V.B. Liju, Vijayan Arun, J.V. John Reena, B. Parthipan, C. Renuka. *Indian Journal of Traditional Knowledge*, 2007, 6(4), 589-594.
2. Y.Tijani, M. O. Uguru, O. A. Salawu. *African Journal of Biotechnology*, 2008,7(6), 696-700.
3. P.C. Pande, Lalit Tiwari, H.C. Pande. *Indian Journal of Traditional Knowledge*,2007,6 (3), 444-458.
4. Anonymous, *The Wealth of India- Raw Materials*, Council of Scientific &Industrial Research, New Delhi,2005,55-57.
5. R.K. Gupta, *Medicinal & Aromatic Plants*, CBS publishers & distributors, 2010,190.
6. Anonymous, *The Wealth of India- Raw Materials*, Council of Scientific &Industrial Research, New Delhi, 2005, 17-18.
7. R. Zafar, *Medicinal Plants of India*. CBS publishers & distributors, 2009, 1-15.
8. Y. Tijani, M. O. Uguru, O. A. Salawu. *African Journal of Biotechnology*, 2008,7(6), 696-700.
9. V. Hariharan, S. Rangaswami, *Phytochemistry*, 1970, 9, 409-414.
10. M. Ali. *Oriental Journal of Chemistry*, 1993, 9 (1), 84-85.
11. G. Michl, D. Abebe, F. Bucar, A. Debella, O. Kunert, M.G. Schmid, E.Mulatu, E. Haslinger. *Helvetica Chimica Acta*, 2000, 83(2), 359-363.
12. A. S. Chauhan, G. S. Rawat, C. P. Singh. *Asian Journal of Chemistry*, 2002,14(2), 1059-1061.
13. A.K. Batta, S. Rangaswami. *Phytochemistry*, 1973, 12 (1), 214-216.
14. V. K. Kapoor, H. Singh. *Indian Journal of Chemistry*, 1966, 4(10), 461.
15. R.D. Rameshwar. *Indian Perfumer*, 2007, 51 (1), 33-34.
16. A. Chakraborty, A. Brantner, T. Mukainaka, Y. Nobukuni, M. Kuchide, T. Konoshima, Tokuda H., Nishino H. *Cancer letter*, 2002,177(1 ), 1-5.
17. A.R. Bafna, S.H. Mishra. *Ars Pharmaceutica*, 2004, 45 (4), 343-351.
18. T. Jayakumar, M.P. Sridhar, T.R. Bharathprasad, M. Ilayaraja, S. Govindasamy, M.P. Balasubramanian. *Journal of Health Science*, 2009, 55 (5), 701-708.
19. P. Tahiliani, A. Kar. *Journal of Ethnopharmacology*,2000,71(3), 527-532

20. D.S. Gayathri, A. Archanah, P. Abiramasundari, V. Priya, K. Uma, T. Abirami. *Indian Journal of Nutrition and Dietetics*, 2009, 46 (12), 485-490.
21. T. Malarvili, N. Gomathi. *Biosciences Biotechnology Research Asia*, 2009, 6(2), 659-664.
22. S. Edwin, E. Jarald, D.L. Edwin, A. Jain, H. Kingler, K.R. Dutt, A.A. Raj. *Pharmaceutical Biology*, 2008, 46(12), 824-828.
23. R.D. Rameshwar, N. Akito. *Natural Product Communications*, 2007, 2(7), 727-730.
24. Bhom, K.H., Liersch, R., Haensel, R., Keller K., Rimpler, H., Schneider, G. (Eds.), *Hagers Handbchder Pharmazeutischen Praxis*, V. Spring Verlag, Berlin, 1992, 54-59
25. R. Ikan, U. Ravid, D. Trosset, E., Shulman. *Experientia*, 1971, 27 (5), 504-505.
26. H.N. Khastgir, S. K. Sen Gupta, P. Sen Gupta. *Journal of the Indian Chemical Society*, 1958, 35, 693-694.
27. A. Banerji, M.S. Chadha. *Photochemistry*, 1970, 9 (7), 1671.
28. Ram P. Rastogi, B.N. Mehrotra. *Compendium of Indian Medicinal plants*. Central Drug Research Institute, Lucknow and National institute of Science Communication and Information Resources, New Delhi, Vol. II, 2004, 8.
29. *Journal of the Chemical Society of Pakistan*, Volume 28, Issue 4, Pages 347-351, 2006.