

**AMMANNIA BACCIFERA–POTENTIAL MEDICINAL WEED OF RICE FIELDS – AN OVERVIEW**

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### Summary

Plants have been used and are being used, in virtually all cultures as a source of medicines, and there is no plant on this earth which is devoid of medicinal value. It is our duty to unearth the medicinal properties of these plants. In this context, weeds, which are considered as relatively non- useful plants and that grow wild along with the required ones by competing for water and soil nutrients, needs scientific community attention as probable source of potential medicines. *Ammania baccifera* Linn. (Lythraceae) is a common weed in rice fields and marshy localities throughout India. Traditionally, it has been claimed to be useful in vitiated conditions of *vata*, *pitta*, *kapha*, seminal weakness, renal and vesicular calculi, rheumatism, intermittent fevers and herpetic eruptions, is a rich source of vitamin-C and reported to possess antityphoid, antitubercular, laxative, diuretic and antibacterial properties. This article presents an overview on scientifically established and published phyto-pharmacological properties of the herb.

**Key-words:** Weed, *Ammania baccifera*, Lythraceae, Phyto-pharmacological.

### Introduction

Weeds are usually considered as plants that thrive in sunlight and disturbed areas, establish their presence quickly and grow where other plants can't. Conservationists have long pointed out that primary tropical rainforests may have dramatic value because of important and undiscovered medicinal plants. New research has found that weeds in easy-to-reach disturbed areas may be even more important. The idea that tropical rainforests may hold the key to new medicines that can solve everything from AIDS to cancer has been around for some time.

Indeed, one study found that of the 95 plant species now used for prescription drugs, 39 originate in and around tropical forests. John R. Stepp, a research scholar, during his doctoral field work in the Mexican state of Chiapas and research with North American tribes, found that, nearly all the medically important plants being used grow as weeds in disturbed areas not far from their houses or villages. While considerable scientific attention has been given to the potential value of medicinal plants deep in tropical rain forests, very little research has been done on the potential medicinal value of common weeds<sup>1-8</sup>. This article reviews phyto-pharmacological properties of common but medicinally potent weed of rice field *Ammannia baccifera*.

### **History, Back Ground And Distribution**

The plant *Ammannia baccifera* Linn. (Lythraceae) is an important Ayurvedic and Unani herb known as Blistering ammania(Eng), Kurandika, Agnipatri (Sansk.). This erect glabrous reddish herb is very common in rice fields and marshy localities all over India. Leaves are oblong or narrow elliptic, rounded, usually obtuse; flowers reddish in dense axillary clusters, apetalous; fruits depressed globose capsules covered by calyx<sup>9</sup>.



*Ammannia baccifera* herb

**Traditional / Ethno -Medicinal Uses**

In Ayurveda, the leaves are used as bitter, appetizer, laxative, stomachic, aphrodisiac, to remove *vata*, *kapha*, seminal weakness, renal and vesicular calculi, rheumatism, intermittent fevers and herpetic eruptions, is a rich source of vitamin-C and reported to possess antityphoid, antitubercular, laxative, diuretic and antibacterial properties. In Yunani leaves are used as appetizer. The leaves are exceedingly acrid; they are used universally by natives to raise blisters in rheumatic pains fevers etc. The fresh leaves, bruised and applied to the part intended to be blistered. The leaves are applied to cure herpetic eruptions. Infusion of dried plant has been cited to be used orally by male adults in India as aphrodisiac and against syphilis<sup>9-16</sup>.

**Chemical Constituents**

Flavonoids, Sterols, Triterpenes, Tannins, Vitamin-C. (Hentriacontine, Dotriacontanol, Betulinic acid, Lupeol, Ellagic acid, Quercetin, Lawsone)<sup>12, 13, 14</sup>.

Compounds isolated :

Two new terpenic compounds-Ambacinol, ambacinin, four known compounds-  $\beta$ - sitosterol-3- O- $\beta$ -glucopyranoside, Quercetin-3-rutinoside (Rutin), kaempferol-3- O- $\beta$ -glucopyranoside and Quercetin-3- O- $\alpha$ -L-rhamnoside (Quercetrin) have been isolated. The identity of all these four steroidal and flavonoid glycosides were established on the basis of chemical shifts and spectral data<sup>19</sup>.

**Pharmacological Activities****Toxicity assessment:**

The toxicity assessment was carried out in mice by administering 1.0 g/kg of ethanol:water (1:1) extract of the entire plant intraperitoneally and the LD<sub>50</sub> was found to be 1g/kg<sup>19</sup>.

**Anti fungal activity:**

Undiluted aqueous extract was found to be active against *Helminthosporium turcicum* on agar plate model<sup>11, 19</sup>.

**Hypotensive activity:**

Hydro-alcoholic extract at 50 mg/kg body wt. intravenously in dogs exhibited positive hypotensive activity<sup>19</sup>.

**Antisteroidogenic activity:**

Ethanol (90%) extract of *Ammania baccifera* (L.) whole plant (EEAB) was evaluated for possible antisteroidogenic activity in mature female mice ovaries. The ethanol extract at the doses of 100, 200 and 400 mg/kg body weight (i.p) arrested the normal estrus cycle at dioestrus phase and significantly decreased weight of ovaries. The cholesterol and ascorbic acid content in ovaries were significantly elevated in treated mice. The extract also significantly inhibited the activity of  $\Delta^5$ -3 $\beta$ -hydroxy steroid dehydrogenase ( $\Delta^5$ -3 $\beta$ -HSD) and Glucose-6-phosphate dehydrogenase (G-6-PD), the two key enzymes involved in ovar-ian steroidogenesis. Results of this study suggested that the ethanol extract of whole plant of *Ammania baccifera* (L.) acts as an antisteroidogenic agent<sup>20</sup>.

**Analgesic activity:**

The analgesic activity of the ethanol extract of *Ammania baccifera* Linn whole plant (EEAB) was investigated in chemical models of nociception in mice. EEAB at doses of 200, 400 and 600mg/kg *i.p* produced an inhibition of 20.7%, 43.4% and 72.9%, respectively, of the abdominal writhes induced by acetic acid in mice. In the formalin test, the administration of 200,400 and 600mg/kg *i.p* had no effects in the first phase (05 min) but produced a dosedependent analgesic effect on the second phase (15š40 min) with inhibitions of the licking time of 27.3%, 47.7% and 57.4%, respectively. These observations suggest that *Ammania baccifera* possesses some analgesic activity <sup>21</sup>.

**Antifertility activity:**

The 90% ethanolic extract of *Ammannia baccifera* whole plant was administered to mature male rats at different dose in alternate days for 18 days. After final dose and 18 hrs fasting, rats were sacrificed to evaluate antifertility activity. Results showed that weight of testis and epididymis decreased significantly where as there was no significant change in the body weight. Sperm density, motility and fructose content in seminal vesicles were found to reduced significantly in extracted rats. The cholesterol and ascorbic acid levels elevated significantly also the activities of 5-3 -hydroxy steroid dehydrogenase ( 5-3 -HSD) and glucose-6-phosphate dehydrogenase (G-6-PD), the two key enzymes involved in androgen biogenesis, were significantly inhibited in extract-treated rats. Results indicates that the whole plant extract inhibits steroidogenesis thereby acting as antifertility agent in male rats <sup>22</sup>.

**Antibacterial activity:**

The plant material was extracted with distilled water (aqueous) and methanol. The preliminary screening experiment revealed that methanol extracts were more potent than the aqueous extracts. The plant extracts were more active against gram-positive bacteria than gram-negative bacteria. The most susceptible bacteria were *K. pneumoniae* and the most resistant bacteria were *E. coli* . *Bauhinia variegata* L. exhibited remarkable antibacterial activity <sup>19, 23, 24, 25</sup>.

**Protection against CCl<sub>4</sub> - induced oxidative stress:**

Ethanol extract of *Ammannia baccifera* was studied for its protective nature against the oxidative damage of lipids, proteins and DNA in carbon tetrachloride (CCl<sub>4</sub>)-induced toxicity in rats.CCl<sub>4</sub> administration to albino Wistar rats increased the levels of lipid peroxidation, protein carbonyls and decreased the levels of total sulfhydryls. CCl<sub>4</sub> also induced the elevation of DNA damage measured by the comet assay. The study revealed that the administration of the ethanol extract of *A. baccifera* to CCl<sub>4</sub> intoxicated rats could significantly ( *P* < 0.01) decrease the levels of lipid peroxidation, protein carbonyls and increased the levels of total sulfhydryls in a dose-dependent manner. It was also found that the ethanol extract of *A. baccifera* prevent the CCl<sub>4</sub> -induced elevation of DNA damage in hepatocytes. These results suggest that treatment with the ethanol extract of *A. baccifera* can minimize the deleterious effects caused by CCl<sub>4</sub> through its strong antioxidative and free radical scavenging properties <sup>26</sup>.

**Antiuro lithic activity:**

Ethanol extract of *A. baccifera* was tested for its antiuro lithic activity in male albino rats. Urinary stones were induced by implantation of zinc discs in the urinary bladder. The stones formed were mainly of magnesium ammonium phosphate with traces of calcium oxalate. Ethanolic extract of *A. baccifera* (2g/kg/day, po) was found to be effective in reducing the formation of stones as also in dissolving the pre-formed ones.

There was a significant increase in the urinary excretion of calcium, magnesium and oxalate, four weeks after implantation of zinc discs. Treatment with *A. baccifera* has significantly reduced calcium and magnesium levels in the prophylactic group while it has reversed the levels of these ions to normal values in the curative group<sup>27</sup>.

#### Cytotoxic activity:

Methanolic extract of *Ammannia baccifera* was screened for cytotoxic activity against healthy mouse fibroblasts (NIH3T3) and three human cancer-cell lines (gastric: AGS; colon: HT-29; and breast: MDA-MB-435S) using the MTT assay. It showed low toxicity (IC(50) > 2.5 mg mL(-1)) against mouse fibroblasts but selective cytotoxicity (IC(50) 0.2-2.3 mg mL(-1)) against different cancer cell lines<sup>28</sup>.

#### Conclusions

The vast majority of people in the world takes care of themselves and uses healing plants that have been used for hundreds of generations. The discovery that easy-to-find weeds may be more important as medicinal plants than exotic species "hidden" deep in the rainforests, may catch some people by surprise. There is also good biochemical evidence that supports the hypothesis that plants in disturbed areas are likely to have more chemicals in them for defense. We may find that the next plant-derived pharmaceutical is in the abandoned lot down the street. Weeds in disturbed areas may be source of more medically important compounds than plants in tropical rainforests. While considerable scientific attention has been given to the potential value of medicinal plants that grow deep in tropical rainforests, very little research has been done on the potential medicinal value of common weeds that grow in nearby areas, and *Ammannia baccifera* being a common weed of rice fields and because of documented Ethnopharmacological uses, needs scientific community attention for further research as probable source of potential medicines.

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