

ETHNOBOTANICAL STUDIES IN *Desmostachya bipinnata* (Linn.) STAPF. : A REVIEW

Syed Irfanur Rahman* and Manoj Kumar**

Key words : Ethnobotanical, *Desmostachya bipinnata* (L.), Bioconstituents.

Desmostachya bipinnata (L.) Stapf. (Poaceae), or *Kusha* in Sanskrit, is a sacred grass used extensively in Indian Vedic practices. It is well known for its medicinal value and is used in traditional Indian medicine to treat microbial infections in combination with other herbs. Thus a literature review was conducted to elaborate the ethnobotanical as well as clinical importance of this sacred grass.

INTRODUCTION

At present, herbal medicine represents one of the most important fields of traditional medicine all over the world. To promote the proper use of herbal medicines and to determine their potential as sources for new drugs, it is essential to study medicinal plants having folklore reputation in a more intensified way. Medicinal plants have been used for centuries by a vast human population of the world as remedies for human diseases.

Desmostachya bipinnata (L.) Stapf., Poaceae, is considered as a highly sacred grass among Vedic scholars in India. It is known as '*Kusha*' in Sanskrit and constitutes a vital ingredient for almost all Vedic rituals and sacrifices. Its miraculous healing powers and medicinal value have been well documented in various Ayurvedic texts and preparations such as *Tripanchamool*, *Kusablecha*, and *Kusadya-ghrita* (Shrestha *et al.* 2000). Its chief medicinal properties include its uses as an astringent, galactagogue, analgesic, antipyretic, aphrodisiac, anti-inflammatory, wound-healing, anti-asthmatic, anti-diuretic and as a sedative to pregnant women. It is used along with other herbs to treat dysentery, diarrhoea, jaundice, dysuria, nausea, menorrhagia and skin infections (Kirtikar and Basu, 1918; Joshi, 2003; Alikhan and Khanun, 2004).

The scarcity of fresh and novel therapeutic agents or compounds and the severe unrelenting global clinical problem of antibiotics 'resistance' have also put on the spotlight the generous use of already commercialized antibiotics. This scenario thus signals a critical need for innovation, which is further exacerbated due to a global retreat on the development of new API (Active Pharmaceutical Ingredient) by the pharmacological sector. Under the realization of this situation, the present literature review related to ethnobotanical importance of *Desmostachya bipinnata* (Linn.) was conducted.

DISCUSSION

Desmostachya bipinnata (Linn.) belongs to the family, Poaceae (Graminae). It is known as Sacrificial Grass or Saved Gram in English (API, 2001). It is used for medicinal as well as holy purposes. It is known as Tharuppai and its kudineer is

prescribed for any type of disorder, fevers, itching and diuretic problems in *Siddha* literatures. It is useful for curing urinary tract diseases and excessive vaginal discharges (Pillai & Villakkam, 1967). Many secondary metabolites have been isolated from this plant, such as scopoletine, umbelliferone, sugars, amino acids, carbohydrates, kaempferol, quercetin, quercetin-3-O-glucoside, trycin, trycin-7-O-glucoside from the aerial part; 4-methoxy quercetin-7-O-glucoside from the whole plant; 2, 6-dihydroxy-7-methoxy-3H-xanthen-3 - 1 from leafly culms and eseroline, camphene, caryophyllene diepoxide from the aerial parts (Hifnawy, 1999; Awaad *et al.* 2008; Ramadan and Safwat, 2009; Shrestha, 2011; Kumar *et al.* 2010).

Medicinal plants constitute an important component of human need and are widely distributed in India. The pharmacological evaluation of substances from plants is an established method for the identification of lead compounds which can help the development of novel and safe medicinal agents. Traditional systems of medicine continue to be widely practised in rural Bihar. Population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several allopathic drugs and development of resistance to currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments (Joshi, 2003).

The herbal plant *Desmostachya bipinnata* is used in *yagnas* and religious rites (Prajapati *et al.* 2003). It has several synonyms like *Briza bipinnata* L., *Eragrostis bipinnata* L., *Eragrostis cynosuriodes* (Retz.), commonly known in English by names Haifa grass, an old perennial grass. *Desmostachya bipinnata* is native to north east, west tropical, Northern Africa and countries in the Middle East, temperate and tropical Asia including India. According to religious books *Desmostachya bipinnata* has long been used in various traditions as a sacred plant. The plant was mentioned in the *Rig veda* for use in sacred ceremonies and also seat for priests. In arid regions *Desmostachya bipinnata* has been used as a fodder for domesticated livestock.

*Research Scholar, Magadh University, Bodh-Gaya

**Associate Professor, Department of Botany, College of Commerce, Arts and Science, Patna

Desmostachya bipinnata (L.) Stapf. is noted for its medicinal properties against skin infections and digestive problems. It has always been used in combination with other medicines in preparations of *Ayurvedic/Siddha* Indian system (Kirtikar and Basu, 1918; Joshi, 2003). Much research has not been done on this plant and very few constituents have been isolated and characterized. β -Sitosterol-D-glucopyranoside has been previously reported in this plant (Cruz *et al.* 2008). The antibacterial activity of p-sitosterol-D-glucopyranoside has also been previously reported (Chattopadhyay *et al.* 2001), where fraction containing β -sitosterol-D-glucopyranoside, isolated from the leaf extracts, exhibited MIC at 1000-2000 $\mu\text{g/ml}$ against resistant bacteria and $>128 \mu\text{g/ml}$ against fungal organisms.

The fact that *D. bipinnata* extracts increase the properties of other medicinal preparations (works synergistically) is well documented by traditional medics in India (Shrestha *et al.* 2000). This study proves significant synergy and additive effects of BS-antibiotic combinations against various pathogens. To gain better insight about the rate of action of isolated compound, time kill analysis was performed, which could be generally used to determine rapidity and duration of antibacterial action against particular pathogens (Devi *et al.* 2010). Further phytochemical pursuits for other similar glycosides or different bioactive molecules from this medicinally active plant will open up new prospects in this field of research. Also, combination of such anticipated molecules with other well established drugs could further solve the question of drug interactions and synergism as substantiated by traditional texts.

The pathology of numerous chronic diseases, including cancer, heart disease and degenerative brain disorders, involves oxidative damage to cellular components. The chemically unstable free radicals can cause extensive damage to cell as a result of imbalance between the generation of reactive oxygen species (ROS) and the antioxidant enzymes. Harmful effects of ROS include peroxidation of the membrane lipids, aggression to tissue proteins and membranes, damage to DNA and enzymes. Antioxidants terminate direct ROS attacks and radical-mediated oxidative reactions, and appear to be of primary importance in the prevention of these diseases and health problems. Unstability and highly volatile nature of synthetic antioxidants frequently raised doubts about their safety and efficacy. Consequently, the need to identify alternative natural and safe sources of food antioxidants arose, and hence the search for natural antioxidants, especially of plant origin, has increased in recent years. Plants have been

reported to exhibit antioxidant activity due to the presence of antioxidant compounds such as phenolics, proanthocyanidins and flavonoids. The antioxidant activities of phenolics play an important role in the adsorption or neutralization of free radicals. The beneficial effects of antioxidants on promoting health is believed to be achieved through several possible mechanisms, such as direct reaction with and quenching of free radicals, chelation of transition metals, reduction of peroxides, and stimulation of the antioxidative enzyme defense system (Ebrahimzade *et al.* 2009; Hussain *et al.* 1987; Madhavi, 1995; Rice *et al.* 1995).

Desmostachya bipinnata is a perennial grass growing up to 50 cm in height and found throughout India in hot and dry places. Leaves many, long, acute, linear, with hispid margins; panicle erect, clothed with sessile spikelets; grains small, ovoid, trigonos and laterally compressed. This plant pacifies *pitta* and asthma. In Indian traditional medicine, it is used as diuretic and in burning sensation and excessive perspiration (Dhiman, 2007; Kulkarni and Ansari, 2000; Awaad *et al.* 2008; Mohammad *et al.* 2009).

According to the World Health Organization, out of nearly 450 million people suffering from psychological or behavioural ailments, only a small minority of them receive even the most elementary treatment. This amounts to 12.3% of the global load of disease and will rise to 15% by 2020. In the search for new therapeutic products for the treatment of neurological disorders, medicinal plant research has progressed constantly representing the pharmacological effectiveness of diverse plant species in a variety of animal models. It is now clear that without awareness of clinical and biological aspects of anxiety and depression, it is difficult to offer actual treatment approaches for the patients. There has been an intensive study of a variety of neurobiological aspects of depression and anxiety from the past decades (Reynolds, 2003; Patel and Shah, 2016). Presently the most commonly approved medications for anxiety disorders are benzodiazepines but their clinical applications as antianxiety agents are limited due to their undesirable effects. Therefore the development of new pharmacological agents from plant sources are well justified.

Desmostachya bipinnata, commonly known in English as Haifa grass, big cordgrass, and salt reed-grass is an old world perennial grass used in human history. From literature survey it was found that *Desmostachya bipinnata* possesses antibacterial activity, anti-ulcerogenic, antioxidant and DNA damage protection activity, anti-histaminic activity and anti-obesity activity. It shows diuretic and laxative activity, anti-

diarrhoeal activity, anti urolithiatic activity, anti-helicobacter activity, use in gut disorders and asthma analgesic and anti-inflammatory, hepatoprotective activity (Hina *et al.* 2001; Upendrarao, 2014; Singh *et al.* 2014, Yaso *et al.* 2016; Upendrarao, 2013; Galla *et al.* 2014; Medha *et al.* 2010; Kishore *et al.* 2014; Hafiz *et al.* 2013; Kumar *et al.* 2010; Rahate and Rajsekharan, 2015).

Herbal treatment for diarrhoea and asthma in natural and traditional medicinal practices includes use of plants or plant extract such as *Semicarpus anacardium*, *Achyranthes aspera*, *Rhus semialata*, *D. bipinnata*, *Elytraria acaulis*. Antidiarrhoeal activity of *D. bipinnata* has been investigated for alcoholic and aqueous extract of *D. bipinnata* by castor oil induced diarrhoea in Wistar rats and charcoal meal stimulated gastrointestinal transit in albino mice (Ahmad *et al.* 2010; Alexander *et al.* 2011; Jain *et al.* 2005; Katewa and Galav, 2006; Hegde *et al.* 2010). Literature review revealed that antiasthmatic activity of *D. bipinnata* has not yet been investigated. Furthermore, active constituents responsible for antiasthmatic and antidiarrhoeal activity have not been isolated from *D. bipinnata*.

The present review concluded that the isolated compounds from the sacred and worshiped plant *Desmostachya bipinnata* shows the various clinical effects and antibacterial effects against different bacteria. Further study is needed for the isolation of the constituents present in the plant and its individual pharmacological activity needs to be reconsidered and ultimately it should be implemented for the benefit of humankind.

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