

# Study On Boerhavia Diffusa Linn. As An Important Medicinal Plant Resource And Its Market Economy: A Review

Shadab Ali<sup>1</sup>, Anuradha Singh<sup>2</sup>, Anjali<sup>3</sup>, Amar Singh Kashyap<sup>\*4</sup>

<sup>1</sup>Department of Biosciences, School of Basic & Applied Sciences, Galgotias University, Greater Noida, Uttar Pradesh, India.

<sup>2</sup>Department of Biosciences, School of Basic & Applied Sciences, Galgotias University, Greater Noida, Uttar Pradesh, India.

<sup>3</sup>Department of Biosciences, School of Basic & Applied Sciences, Galgotias University, Greater Noida, Uttar Pradesh, India.

<sup>4</sup>Assistant Professor, Department of Botany, Multan Modi (P.G.) College, Modinagar, (Ch. Charan Singh University, Meerut), Uttar Pradesh, India.

\*Corresponding author's E-mail: [dramarskashyap@gmail.com](mailto:dramarskashyap@gmail.com)

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## Abstract

Punarnava (*Boerhavia diffusa* Linn.) is a traditional medicinal herb. It is widely distributed in India as well as worldwide. This plant has wide biodiversity with 40 species. It is found in tropical, sub-tropical and temperate regions of the World. It has a great share in the AYUSH trading. Several herbal companies and pharma units are consuming a lot of quantity of *Boerhavia* crude drugs. The herbal market is dominated by *Boerhavia* and some many other Indian herbal products, even crude drug markets are also playing a major role in the Indian economy like Khari Bavli in Delhi, Herbal center in Dehradun, Trade Center in Bhopal and Raipur, etc. Many pharma companies are manufacturing a huge number of products that are used by people for different ailments. About 15 essential amino acids are found in the plant. Potassium nitrate and Punarnavine alkaloid are found in plenty of amount. Punarnava is used in the kidney, liver, spleen, and neural diseases. NMPB and allied agencies are trying to uplift the trade in herbal drugs in the world so that we could be able to stand first in the world.

**KEYWORDS:** Punarnava, Ayurvedic, Marketing, Trading, Crude Drugs, AYUSH.

## INTRODUCTION

The plant punarnava scientifically *Boerhavia diffusa* L. belonging to the family Nyctaginaceae, has medicinally great value in the treatment of human and cattle ailments. It has great ethnobotanical uses also. The whole plant is useful. Its scientific name is given after the famous Dutch Physician (18th century) Herman Boerhaave [1]. In Hindi, it is called Punarnava, this word has been taken from Sanskrit. *Boerhavia diffusa* L. commonly known as 'Punarnava' which means rejuvenation in nature. Its habit and habitat are as a terrestrial wild habitatic plant, appearance as diffused perennial herbaceous creeping weed. It itself rejuvenate you after year in the same manner. It helps to rejuvenate the human liver and other body parts [2]. It is found on waste land, old buildings and fields. It is diversitic plant. There are about 40 species but only six species are present in our country and popularly known *B. diffusa* is one of them and preferred to considered in the present study [3].

**Distribution of Punarnava:** It is dominated in India as well as in Nepal, China, Pakistan, Sri Lanka, South Afrika, USA, Australia, Egypt, Sudan and Middle East. In India, it is distributed in all over parts and states and known by different names as Rakta punarnava (Sanskrit and hindi), Dholisaturdi and Motosatodo in Gujrati, Mukurattai (Shihappu) in Tamil, Atikamamidi and Erra galijeru in Telugu, Khattan in Punjabi, Sanadika/Kommeberu/Komma in Kannada, Vanjula Punarnava in Kashmiri, Ghetuli and Khaparkhuti in Marathi, Rakta punarnava in Bengali, Chuvanna Tazhutawa in Malyalam, etc. [2].

**Plant's Taseer (Ayurvedic Medico nature):** It is warm in nature, i.e., garam taseer. It is carminative, atrangic, analgesic, diuretic, expectorant, laxative, anti-epilepsy, anti-cough and liver tonic [4, 5, 6].

**Phytochemical constituents:** Phytochemically, *Boerhavia diffusa* L. contains a large number of active compounds. It contains 15 essential amino acids including 7 essential amino acids in root and the axial part contain 15 aa (including 6 essential amino acids) [7]. Punarnava, whole plant has active constituents, i.e., lipids, carbohydrates, proteins, glycoproteins (as primary metabolites), while alkaloids, flavonoids, sterols, terpenoids, saponins, tannins, lipids, lignin, carbohydrates, protein, saponins and glycosides quality etc. are in rich form even antioxidants are found in huge amount. The plant has some peculiar characters which has ursolic acid, punarnavine and a significant amount of potassium nitrate [3].

**Products in market:** Various types of medicinal products are present in the market which are manufactured by different renowned pharmacies. The products are found in the form of Syrup, tablets, Churn, Mother-Tincher, Quath, Food supplements, grains, Oil, etc. These market products are developed either purely by Punarnava plant or used as an efficient active constituent in the formulations. These products are using by local, country wide and worldwide for the ailments of various diseases. For example, "Axiom Punarnava Panchang Juice" is a produced by *B. diffusa*, and it is used to treat calculi, weakness, weight management, enlarged prostrate and liver and spleen problems. "Punarnava Capsules" by "Arogyam" are also available in market for kidney ailments, enhancement of liver function, maintenance of urinary tract, against arthritis, improving digestion and metabolism. "Arjun Punarnava Jatamansi Juice" is also available in overall rejuvenation of the body. Many more products are also there in the market, e.g., "Punarnava Mandur, Punarnava Sticks, Pitta Balance, Naturz Ayurveda Punarnava 350mg Capsule, Bliss Wellness Kidney Detox Cleanse Purifier, Basic Ayurveda Makoy & Punarnava Mix Juice, Ayur Champ Punarnava Kidney Support, Punarnava Root Powder *Boerhavia diffusa*, Rencure Formula, Merlion Naturals Punarnava Tablet, Healthvit Natural Punarnava (*Boerhavia diffusa*) Powder, Planet Ayurveda Punarnava Capsules, Ved Tattva Punarnava Kidney Support Capsule, SNC Punarnava Extract Capsule, Foresta Organics Kidney Detox with Patharchatta, Varuna, Punarnava, & Ganoderma, Punarnava Swaras Ghan, Punarnava Swaras Ghan Vati, Punarnava Putpak Swaras," etc [8].

**Market Economy and its Promotion:** In the view of trading prospects, just after China, India is the second largest country among the world's herbal exporters. India and China have 70 % share of herbal drugs exports in the overseas. As per a published report of National Medicinal Plant Board (NMPB) 2017, out of 6,500 medicinal plant species only 1,622 species are traditionally used by Indian communities. Nearby 1,178 plant species are highly exploiting in the all-India trade which includes herbs (42%), trees (27%), shrubs and climbers (31%) [9, 10]. However, 242 herbal plants have top trading in annual list more than 100 MT [11].

**Trading Prospective (Market Prospective):** Ayurveda with all other Indian systems and world's traditional systems have the share of 80 % among rural people. On an average about 960 plants species are highly exploiting by Indian herbal industries. They have more than 80 billion turn-over among herbal based industries which include Ayurveda, Unani, Siddha and Homeopathy (AYUSH) [12]. There is only 3% share in pharmaceutical export. About 10 billion Rs per annum is the share of crude drug. The finished products have 30% share. India has less than 1% share of international market [12]. We have the great opportunity to exploit the natural resources in the world. We required the standard ways of quality control at every step to develop the reliable market in the world. Our regulatory guidelines must be hard and fast for GMP (Good manufacturing Practices) [13]. It should be included agricultural practices of

herbal crops, collection practices, storage, transportation, and trading processes [25, 26, 27]. The Drugs and Cosmetics Act 1940 must be revived according to the present requirements of GMPs [13].

**Promotional Steps/Exploiting Steps:** According to 2019 BRC report, India has 4.2 billion Rs (US\$ 56.6 million) trade and it has the target of 14 billion Rs (US\$ 188.6 million) by 2026. The world's herbal business is nearby 120 billion US\$ but India's share is very low, i.e., 1%. India has a bright future in the field of herbal trading where the growth rate is 14.22 % as it was observed in the previous tenures [14]. The demand of herbal based products either in medicines or supper foods is increasing day by day. For this purpose, Indian Government is promoting the herbal based industries and entrepreneurship. NMPB, SMPB, Export Promotion Councils (EPCs), Forest Products Export Promotion Council (SHEFEXIL), Pharmaceuticals Export Promotion Council (PHARMEXCIL), NRDC, NABARD, and different other agencies are promoting herbal based activities. The manufacturers, growers, and traders required single platform to access all facilities is initiated by Government of India, Ministry of Finance, Ministry of AYUSH, Ministry of Science and Technology, and Ministry of Empowerment are going to make a secure and successful path. Financial assistance, export facilities, organize trade fairs, buyer–seller meets (BSMs), reverse buyer–seller meets (RBSMs), research and product development, market studies, etc. are governing by active agencies. The International Cooperation Scheme by the Ministry of AYUSH provides financial assistance to exporters to help them participate in trade fairs, organize international business meets & conferences and avail product registration reimbursements.

*Boerhavia diffusa* Linn. is promoted by NMPB, Ministry of AYUSH. It is under the listed of priority medicinal plants which is grown under the subsidize crops i.e., for *Boerhavia diffusa* 17,569.2 Rs was allotted by NMPB, up to 30% cost was subsidized. It was sanctioned by NMPB in 2016-17 [10].

**Ethnobotanical Uses:** It has been utilizing some medical utilization by herbal experts, Vaidyas, Traditional medical users. It has been in practice by Ayurveda, Unani, Sidhha, Homeopathy and now in Modern pharma industries [15].

**Useful in Different Ailments:** This plant is diuretic and its root is used for the ailments of all kinds of inflammation, jaundice, liver disorders, kidney disorders, abdominal tumors, etc. This plant is also used to treat various eye disorders [15]. Its air-dried roots show strong antiviral activity against certain viruses, e.g., TMV and GMV [16, 24]. The root is also used to treat gonorrhoea, dyspepsia, edema, jaundice, menstrual disorders, anemia, enlargement of spleen, abdominal pain and cancers. Various potent antidotes for the rat and snake bites are also produced from this plant [15]. It is also used for the control of diabetes due to its anti-diabetic property. The extracts of this plant also have the hepatoprotective activity [17].

**Liver Health:** The investigation done by Rawat et. al., in 1997 validates that the use of *Boerhavia diffusa* roots in hepatic ailments by the many Indian tribes. According to them, the hepatoprotective property of *B. diffusa* showed the marked protection of serum parameters in thioacetamide (TAA) toxicity in rats. Summer season was suggested as the proper time of harvesting of plant root or root collection of *B. diffusa* due to its high activity in summer [18]. The formulation (Livogrit) prepared by Balkrishna et al., in 2021 after mixing aqueous extracts derived from, *Boerhavia diffusa*, *Phyllanthus niruri* and *Solanum nigrum* in 2:1:1 ratio, respectively showed the effective revert of carbon tetrachloride-induced hepatocellular injuries in rats and HepG2 cells. The root cause of the various liver disorders is the chronic hepatotoxicity [19].

**Kidney Health:** Drug, alcohol, medicines induced nephrotoxicity serve the root cause of renal failure. *Boerhavia diffusa* shows nephron-protective activity. It was observed that the herbal combination of *B. diffusa* with the *Tinospora cordifolia* plant showed the significant protection of kidney function from the DCF induced nephrotoxicity, oxidative stress, and inflammation [20].

**Antidiabetic Activity:** In a study conducted by Pari and Satheesh in 2004, the aqueous extract of *B. diffusa* plant leaves showed the significant hypoglycemic and antihyperglycemic properties in normal and alloxan diabetic rats. They observed a significant and decreased level of blood glucose as well as they also observed the significant increase in the plasma insulin level [21].

**Anticancer Activity:** Anticancer activity of *B. diffusa* was observed by Srivastava et al, in 2011. The extracts of this plant were tested on several in vitro and in vivo experimental designs for the anticancer activity and this plant showed the anticancer activity by killing the HeLa cell line in the experimental designs. In the same study, methanolic extract of *B. diffusa* showed the significant decrease in the number of several breast cancer cell types by regulating several biological pathways [22].

In the different-different literatures, *Boerhavia diffusa* also showed the anti-bacterial, anti-stress, analgesic, anti-viral, anti-inflammatory and anti-oxidant activities. It is also used in the treatment of bronchial asthma [2, 3, 17]. Rutwick and Praveen in 2021 did the molecular docking study on the main protease of the SARS-CoV-2 against the secondary metabolites of *Boerhavia diffusa* Linn. and got the many ligand binding sites, that suggests that it can be used for novel COVID-19 drug discovery [23].

## CONCLUSION

Different studies have concluded that *Boerhavia diffusa* Linn. is the boon of nature to human race. It's all parts i.e., root, stem, leaf, seed and fruits are compatible for medicinal values. It is highly effective resource for liver, kidney, spleen and bronchial diseases. It is under the list of higher exploiting medicinal plant which is obtained from the wild resources. It required agro-practice and also required to introduce into agro-crop lists for farmers. It holds handsome share among pharma products. The growth rate of India in herbal industry is 14% stands second, but China stands first. Indian Government is positively trying to uplift the trade with all efforts and certain target.

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