

A Complete Review on Medicinally Active Herbal Weed: *Commelina benghalensis* L. (Commelinaceae)

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Abstract:

Herbal & natural products of folk medicine have been used for centuries in every culture throughout the world. There is no doubt that plants are a reservoir of potentially useful chemical compounds which serves as drugs, which provided a newer leads and clues for modern design by synthesis. *Commelina benghalensis*, also known as Benghal dayflower which is a perennial medicinal plant inhabitant to tropical Asia and Africa. *Commelina benghalensis* is used as folkloric remedy to treat and prevent various diseases like burns, sore throats, headache, leprosy, fever, snake bite and jaundice. It shows Pharmacological activities like laxative, anti-inflammatory, anti-microbial, Anti-cancer, sedative, Analgesic, Hepatoprotective, Anti-depressant, Anti-viral, Antioxidant, Antidiarrheal, Demulcent, Emollient, Diuretic and Febrifuge. Overall, many investigation have been done on pharmacological active phytoconstituents of this plant. Still, many Pharmacological activity of this medicinal weed still need to be carrying out. This review article provides brief review & pharmacological activities of *Commelina benghalensis*.

Key Words: Phytochemistry, Pharmacological Activities, *Commelina benghalensis*, Herbal Weed

INTRODUCTION:

Traditional folk medicines play an important role in health services around the world. Life is impossible without wide use of plants and plant products. World Health Organisation state that a medicinal plant is herbal plant which contains phytoconstituents with therapeutic principle and also important for the synthesis of useful drugs^[1]. *Commelina benghalensis* is ethno-botanical weeding plant which is used for various diseases in India, Nepal, China, Pakistan, Bangladesh and Leshotho. For last many years, this medicinal plant has been used as wide variety of purposes such as food preservation, pharmaceutical, alternative medicine and natural remedies for diseases. Now a day's natural product of plant origin make more interest than synthetic origin. Scientists, researchers and physicians have shown more interest in natural remedies because of the true health benefits and lesser side effect. This plant is the world's worst weed in agricultural field^[2]. *Commelina benghalensis*, also known as Benghal dayflower which is a perennial medicinal plant inhabitant to tropical Asia and Africa^[3]. Around 3/4 of the world population depends on plants and plant products for healthcare^[4].

TRADITIONAL USE:

In India, *Commelina benghalensis* is used to treat headache, constipation, leprosy, fever, snake bite, jaundice^[5-7], mouth thrush^[8], insanity^[9], epilepsy^[10], psychosis disease^[11], Anti-inflammatory, demulcent, emollient and depressant drug^[12,13]. In Lesotho it is used to treat infertility in women. In China it is used as diuretic and febrifuge^[14, 113]. In Pakistan it is used as vegetable and also used to treat leprosy as well as laxative and anti-inflammatory drug^[15,16]. In Nepal, plant paste is used to treat burns and root's juice is used to treat digestive disorders^[17]. In Bangladesh, plant is used to treat Insomnia, cataracts, night blindness, otitis media, suppurative sores, snakebites, inflammation, burns, conjunctivitis, headaches, toothaches, eczema,

abscesses, acne, scabies, warts, respiratory and mental disorders^[18, 19].

Plant Description:

Biological Source: It is annual or perennial weed, whole plant part of *Commelina benghalensis* Linn.

Family: Commelinaceae



“Figure 1: Whole plant”



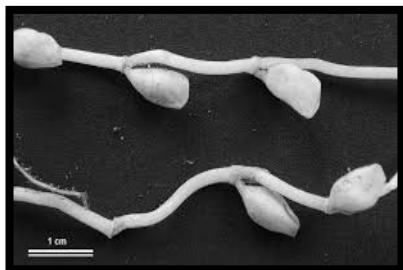
“Figure 2: Flower of plant”



“Figure 3: Seed of plant”



“Figure 4: Root of plant”



“Figure 5: Cleistogamous flower”

TAXONOMY OF *Commelina benghalensis* [20]

Domain: *Eukaryota*
 Kingdom: *Plantae*
 Subkingdom: *Tracheobionta*
 Superdivision: *Spermatophyta*
 Division: *Magnoliophyta*
 Class: *Liliopsida*
 Subclass: *Commelinidae*
 Order: *Commelinales*
 Family: *Commelinaceae*
 Genus: *Commelina* L.
 Botanical name: *commelina benghalensis* L.

VERNACULAR NAMES OF *Commelina benghalensis* [21]

Hindi: Kana, Kankawa, Buchna
 English: Tropical spiderwort, Benghal Dayflower, Wondering Jew
 Gujrati: Sheshmulu
 Kannada: Hittangani
 Malayalam: Kanankoai, Kanchatam
 Manipuri: Wanden khoibi
 Marathi: Kena
 Sanskrit: Kanchata, Kosapuspi, Marishajalaja

Telugu: Neerukaassuvu, Nirukassuvu
 Tamil: Kanangkozai, Adutinnathalai
 Nepali: Kane

SYNONYMS OF *Commelina benghalensis* [22]

Commelina canescens, *Commelina cavaleriel*, *Commelina cuculiata*, *Commelina delicatula*, *Commelina hirsuta*, *Commelina mollis*, *Commelina nervosa*, *Commelina poligama*, *Commelina procurrens*, *Commelina prostata*, *Commelina radiceflora*, *Commelina rhizocarpa*, *Commelina senegalensis*, *Commelina turbinata*, *Commelina uncata* and *Commelina villosiuscula*.

DISTRIBUTION:

Commelina benghalensis found in tropical and subtropical region of Asia and Africa [23]. It is also found in India, Bangladesh, Nepal, Bhutan, China, Japan, Myanmar, Thailand, Philippines, Cambodia, Vietnam, Indonesia, Malaysia, Yemen, Saudi Arabia, Pakistan, North and South America, Pacific Ocean Islands and Australia. Later, this plant is commencing in Cuba, Jamaica, Puerto Rico and Barbados [24].

PHENOLOGY:

Flowering: May to October
 Fruiting: July to December.

HABITAT:

Commelina benghalensis is found in roadsides, waste ground, moist grassland, agriculture field, home gardens, bush land, woodland, tree plantations, running water lands, forest edges and marshlands. Plant augmentation and flowering are best between 20-40 °C. [14, 23, 25]

ECOLOGY: It arises mainly in Southern Africa, India, and Australia. It occurs from sea level to 1,000m and grows best in humid and fertile soil, in sunny or lightly shaded places. It can maintain in loamy, sandy and rocky soils. [14, 25]

MORPHOLOGICAL CHARECTERISTIC [14, 26, 27].

Morphological characteristics of all parts of the plant mention in Table no. 1 which is tabulate at last of the article.

USEFUL PART: Whole plant

“TABLE 1: Morphological characteristics of the plant”

Characteristics	Leaf	Stem	Root	Flower	Seed	Spath
Colour	Green	Green and reddish at the node	Light brown or white	Blue-violet	Black to brown	Green
Odour	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless
Taste	Mucilaginous	Mucilaginous	-	-	-	-
Size	2.5-7.5 cm long 1.5-4 cm wide	10-30 cm in height & 20-90 cm in length	-	10-20 mm long 10-15 mm wide Peduncles 1-3.5 mm long	1.6-3 mm long 1.3-1.8 mm wide	1.5 cm
Shape	Ovate-lenceolate	Cylindrical	Cylindrical	Triangular (butterfly), funnel,	Rectangular	Funnel & compressed
Extra feature	Parallel vination, entire margin, sheath red with white hairs			Produce in spath, petals 3-4 mm long	Netted appearance	

PHYTOCONSTITUENTS:

Commelina benghalensis contains phytoconstituents like alkaloids, flavonoids, coumarins, triterpenoids, steroids, resins, carbohydrates, phenols, tannins, amino acids, quinones, oils and fats, saponins, salicylic acid, chlorogenic acid, 8-hydroxyquinoline, caffeic acid, Quinol, resorcinol, catechol, anthocyanin, beta-amyrin, Lutein, zeaxanthin, Violaxanthin, Carotenoids, Neutraaceutical like vitamin C, proteins, calcium, iron and wax [28-43, 114].

Commelina benghalensis contain different phytoconstituents which play different pharmacological roles like therapeutic, antioxidants and free radical scavenging activity, anti-microbial, hepatoprotective, analgesic, anti-allergic, anti-inflammatory, anti-cancer activity [44, 52].

Tannin – Present in high amount in methanol, water extract and less in petroleum ether, benzene and acetone extract. Tannin shows antiviral and anti-bacterial activities which help to cure wound healing and burns [53], besides it shows anti-diabetic and anti-inflammatory activities [48, 57, 58, 62].

Phenolic: Present high amount in methanol and water extract and less in Acetone extract of plant which shows anti-microbial, antiviral activities.

Saponins: Present in petroleum ether, benzene, chloroform and methanol extract of the plant. Leaves and stem shows anti-hypertensive, anti-oxidant, anti-cancer and immunomodulatory properties in methanol extract, which are helpful to treat tachycardia and mayocardiopathy [46, 47, 52, 54, 55].

Steroids and Terpenoids: Present in petroleum ether, benzene, chloroform and methanol extract of plant. This shows anti-diabetic and analgesic activities in animal studies [49-51].

Resins and balsams: present in alcoholic extract, which shows emollient and demulcent activities as well as for treatment of sore throat, rheumatism, wounds and burns with antiseptic and anti-inflammatory properties [57].

Volatile oil: Used in pharmaceutical or cosmetic industries for production of emollients and demulcents as well as active ingredient for the respiratory tract infections. Also used as flavoring agents, in aromatherapy and perfumery products [54].

Carotenoid: contain high amount of lutein, which can safely used as nutritional supplements or food coloring agent. Also having analgesic properties [34, 56].

Alkaloid: are present in successive extraction of petroleum ether, benzene, chloroform and water extract of plant, which shows antiviral, anti-bacterial anti-diabetic and anti-inflammatory activities [48, 53, 58, 62].

Flavonoid: Present high amount in chloroform, methanol, water extract of the plant, which shows antioxidant and anti-inflammatory activities [57].

Carbohydrates: Present in water extract of plant, which provide energy and regulation of blood glucose level.

PHYSICO-CHEMICAL PARAMETER OF *Commelina benghalensis***Ash values:**

- 1) Total ash: 24.62 % w/w

- 2) Acid insoluble ash: 9.45 % w/w
- 3) Water soluble ash : 13.09 % w/w

Extractive value (maceration extraction)

- 1) Petroleum ether soluble extractive: 3.81% w/w
- 2) Chloroform soluble extractive: 12.67 % w/w
- 3) Methanol soluble extractive: 19.45% w/w
- 4) Water soluble extractive: 34.68% w/w

Moisture content (Loss on drying at 110 °C): 12.45 % w/w

ORGANOLEPTIC CHARACTERISTICS OF SEPARATED SUCCESSIVE SOLVENT EXTRACTS OF *Commelina benghalensis*

- 1) Petroleum ether: **color:** Greenish yellow, **Consistency:** Sticky, semisolid mass
- 2) Chloroform: **color:** Dark green , **Consistency:** Sticky, semisolid mass
- 3) Methanol: **color:** Dark green, **Consistency:** Sticky, semisolid mass
- 4) Water: **color:** Dark brown, **Consistency:** Sticky, semisolid mass

PHARMACOLOGICAL ACTIVITIES:

Analgesic Activity: Ethanol extract of *Commelina benghalensis* root showed, analgesic activity by performing athetoid movement, hot-plate and tail-flick tests in Swiss Albino mice in a dose dependent method [19, 57]. Aerial part extracts of *Commelina benghalensis* shows analgesic activities against Nalbuphine as standard drug [5]. *Commelina benghalensis* is containing sterol, alkaloids, caffeine, anthocynins and carotenoids which might be responsible for analgesic activities [34, 14].

Anti-Inflammatory & Wound Healing Activity: Ethanol extract of *Commelina benghalensis* root shows anti-inflammatory activity by using different models which is due to the presence of resins, balsams, flavonoids and tannins [57, 95]. *Commelina benghalensis* whole plant alcoholic extracts also have anti-phlogistic and substance P inhibition activity [58-61]. It is also reported that *Commelina benghalensis* might be a potent and safe drug for acute and long term use inflammations [58]. Aqueous and alcoholic root extract of *Commelina benghalensis* showed significant wound-healing activities [62]. Methanol extract of dried leaf of *Commelina benghalensis* showed anti-asthmatic activities by inhibit 15-lipoxygenase enzyme [63]. Plant with Commelinaceae family shows anti-inflammatory, antipyretic and diuretic activities [64, 112].

Anti-microbial activities: Ethanolic Leaf extract of *Commelina benghalensis* showed potential inhibitory activities against *Streptococcus lactis* (Gram +ve) and *Enterobacter aerogenes*(Gram –ve) bacteria by performing Agar well diffusion method [52, 66, 67]. Phytoconstituents obtained from plant active against plant and human pathogenic bacteria [65]. In Bangladesh, Antimicrobial activities were found on different extracts of plant by disc diffusion method [68, 69, 111]. Last few years, multiple drug resistance in both plant and human pathogenic bacteria have been developed due to the random use of commercial

antimicrobial drugs which is commonly used in the treatment of infectious diseases [70-72]. Antimicrobial activities of this plant have paying attention for upcoming research [73-74].

Anti-oxidant & Radical Scavenging Activities: Acetone and Methanol extract from aerial parts of *Commelina benghalensis* shows antioxidant activities which work as anti-aging, anti-cancer, cardio-vascular and neurological agent, anti-diabetes and other autoimmune diseases [75, 76, 78, 81]. Methanolic leaf extracts of *Commelina benghalensis* shows high amount of antioxidants, which contains phenols, can help to neutralize free radical so used in pharmaceutical industries [77]. Phytoconstituents like phenolics, flavonoids, protocatechuic acid, vanillic acid, ferulic acid, apigenin, and kaempferol present in plant which shows antioxidant and radical scavenging activities [52, 79, 80].

Diuretic Properties: *Commelina benghalensis* contain flavonoids, tannin, alkaloids, saponins which are secondary metabolites and they show pharmacological activities like diuretic effect [12]. Methanolic extract of whole plant of *Commelina benghalensis* L. shows diuretic effect in albino wistar rats [82].

Larvicidal Activity: Generally, fever like dengue, chikungunya and Zika infections spread by *A. aegypti* mosquito is foremost health problem worldwide. Petroleum ether extracts of *Commelina benghalensis* showed larvicidal activities due to the presence of phytoconstituents like phenol, Flavonoids and resins [83].

Antidiarrheal and Anthelmintic Activity: Methanol extract of *Commelina benghalensis* prevent diarrheal conditions and shows anthelmintic properties which took maximum 22.17 min for the paralysis of the parasite and almost one hour for complete death of the parasite [84, 66].

Hepatoprotective Activity: Alcoholic and aqueous extracts of this plant showed to have great hepatoprotective activity against paracetamol induced hepatic tissue damage from which alcoholic extract shows more effective than aqueous extract. Many therapeutic plants are used to treat degenerative fibrotic hepatic diseases [85-88].

Fertility-Inducing Property: Leaf extract of *Commelina benghalensis* is use to treat female infertility. Furthermore study showed that plant extract became potential applicant to treat male infertility by prevents testicular toxicity induced by environmental toxic substances [89, 90].

Thrombolytic & cytotoxic Activity: Toxicity of plant materials is a main worry to scientists and medical practitioners, researchers and therefore Brine Shrimp Lethality test was conducted to know cytotoxicity which provide important primary data to help select plant extracts with potential antineoplastic properties for future research [91, 92]. Methanol extract of *Commelina benghalensis* showed to have a significant thrombolytic activity using streptokinase enzymes as standard [93].

Anti-cancer Activity: *Commelina benghalensis* contain secondary metabolites like flavonoids, alkaloids, steroids, triterpenes, lactones, coumarins, resins, phenols, carbohydrates and tannins which have anticancer activities.

Methanol extract of *Commelina benghalensis* shows anti-cancer activity by suppressing malignancy cell development and reducing tumor size in Swiss albino mice and normalize haemoglobin level and additional increase the life of mice [94]. Semi-pure extracts of *Commelina benghalensis* can lead to the development of an effective anti-neoplastic drug [95]. The crude methanolic extract of *Commelina benghalensis* contains bioactive phytoconstituents which are useful to suppress tumor growth using tumor protein p53 and Bax and Bcl- 2. Additionally, this anti-cancer activity is a result of deregulated expression of apoptosis-responsive genes [96].

Sedative and Anxiolytic Properties: From last decade, new phytopharmacotherapy from medicinal plants for psychiatric disorder were developed [97, 98]. Chloroform and petroleum ether extract of *Commelina benghalensis* have significant therapeutic efficiency to treat anxiety along with other related neuropsychiatric disorders [99]. Aerial part of *Commelina benghalensis* contains alkaloid and flavonoids which shows strong sedative and anxiolytic activities [19,100]. *Commelina benghalensis* is used to treat excited mental disorder such as psychosis, insanity and epilepsy. [101].

Antidepressant activity: World Health Organization showing that depression is the fourth leading disease of the worldwide, best by lower respiratory infections, perinatal conditions and HIV/AIDS [102]. Around, two third of depressed patients get suicide thoughts and 10-15% of them try suicide [103]. Methanolic extract of leaf of *Commelina benghalensis* shows antidepressant activity by decrease the duration of calmness in animal models, forced swimming and tail suspension tests [104].

Anti-viral Activity: Five different extracts of *Commelina benghalensis* accordingly methanol, ethanol, chloroform, *n*-hexane and benzene were shows the inhibitory effects against dengue virus [45]. Therefore, *Commelina benghalensis* have good anti-viral properties by prophylactic treatment [45]. Viral disease like dengue that represents a major health, economic and social problem in tropical and subtropical areas of the world [105].

Toxicity: Hydroalcoholic extract of leaves of *Commelina benghalensis* was evaluated for acute and sub-acute toxicity in female Wistar rats. This plant extract found Median lethal dose (LD50) was safe. Cytotoxic determination of *Commelina benghalensis* was carried out by performing the Brine Shrimp lethality test which help to evaluate plant's anti-cancer properties and can further help to develop new anticancer compounds [93]. Methanol extract of this plant demonstrated a significant cytotoxic properties against the brine shrimp at a concentration of 278.68 µg/ml [93, 106]. Even high dose 2000/kg of Hydroethanolic extracts of leaves of *Commelina benghalensis* did not showed any toxic reactions thus LD50 of hydroethanolic extracts of *Commelina benghalensis* must be greater than 2000 mg/kg [58].

Heavy metal Phytoremediation: *Commelina benghalensis* are good applicant for phytostabilisation of lead, Cadmium, Copper, Zinc and Manganese in rural drainage ecosystem. *Commelina benghalensis* is use for heavy metal

appropriation from urban/rural stream sediments, with good accumulation in roots which lead good phytostabilization. In *Commelina benghalensis* heavy metal sedimentation found to the shoot and stem which is noticeable for phytoremediation of Copper of urban watercourse ecosystem and wastewaters.^[107]

Antiproliferative/Anti-Lymphoma: Acetone extract of *Commelina benghalensis* shows anti-proliferative properties against Wil-2NS lymphoma cells^[108].

Potential feed for Ruminants: *Commelina benghalensis* as feed for ruminants, effects of plant maturity on composition, rumen degradability, digestibility and Nitrogen balance. Results showed advancing maturity affected the chemical composition, but not rumen degradability. Inclusion of this plant in Sorghum alnum diet improved intake, digestibility and Nitrogen intake, suggesting its potential as food supplement^[109].

Green synthesis and characterization of silver nanoparticles: Silver nanoparticles were effectively prepared using leaf extracts of *Commelina benghalensis*. To develop safe, cost-effective and environmental-friendly technologies for nanoparticles synthesis, Green synthesis play major role. The bioreduction of aqueous Silver ions by the leaf extracts of *Commelina benghalensis* has been established. This bioreduction of the Silver ions leads to the formation of Silver nanoparticles of comparatively well-defined dimensions^[110].

Nephroprotective activity:

Study showed the protective and curative effect of *Commelina benghalensis* against Quinalphos induced oxidative stress in kidney tissue which Results in Nephroprotection from cell damage caused by Quinalphos.^[111]

CONCLUSION:

Herbal traditional plants have the great therapeutic and economic values in all over the world. *Commelina benghalensis* shows many pharmacological effect which are acknowledged in this review. Studies conducted on this plant have showed its broad pharmacological properties with high medicinal values. It has been seen almost all parts of the plants, mainly the leaf contains many different active and non-active chemical compounds that possess a wide range of therapeutic values which have been used widely for centuries as traditional or folk medicine.

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