Technical Data Report

for

ERVA TOSTÃO

Boerhaavia diffusa

Sage Press

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Erva tostão

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Family: Nyctaginaceae

Genus: *Boerhaavia*

Species: *diffusa, hirsuta*

Synonyms: *Boerhavia adscendens, B. caribaea, B. coccinea, B. erecta, B. paniculata, B. repens, B. viscosa*

Common Names: Erva tostão, erva toustao, pega-pinto, hog weed, pig weed, atikamaamidi, biskhapra, djambo, etiponia, fowl's lice, ganda'dar, ghetuli, katkatud, mahenshi, mamauri, ndandalida, oulouni niabo, paanbalibis, patal-jarh, pitasudu-pala, punar-nava, punerva, punnarnava, purnoi, samdelma, san, sant, santh, santi, satadi thikedi, satodi, spreading hog weed, tellaaku, thazhuthama, thikri, touri-touri, tshrana

Parts Used: Herb, roots

Erva tostão is a vigorous, low-growing, spreading vine with a long, tuberous taproot. It produces yellow and white flowers and is sometimes considered an invasive weed. It can be found in many tropical and warm-climate countries. Indigenous to Brazil, it is found in abundance along roadsides and in the forests in and near São Paulo, Rio de Janeiro, and Minas Gerais. Erva tostão is also indigenous to India, where it is found in abundance in the warmer parts of the country.

The roots of erva tostão have held an important place in herbal medicine in both Brazil and India for many years. G. L. Cruz, one of Brazil's leading medical herbalists, reports erva tostão is "a plant medicine of great importance, extraordinarily beneficial in the treatment of liver disorders." It is employed in Brazilian herbal medicine as a cholagogue and diuretic, for all types of liver disorders (including jaundice and hepatitis), gallbladder pain and stones, urinary tract disorders, renal disorders and calculi, cystitis, and nephritis. Erva tostão is called *punarnava* in India, where it has a long history of use by indigenous and tribal people and in Ayurvedic herbal medicine systems. There, the roots are employed as a diuretic, stomachic, laxative, and emmenagogue to treat gonorrhea, internal inflammation of all kinds, dropsy, jaundice, menstrual problems, anemia, and liver, gallbladder, and kidney disorders. Throughout the tropics erva tostão is considered an excellent natural remedy for guinea worms, a bothersome tropical parasite that lays its eggs underneath the skin of humans and livestock; the eggs later hatch into larvae or worms that eat the surrounding tissue. The roots of the plant are normally softened in boiling water and then mashed up and applied as a paste or poultice to the affected areas to kill the worms and express them from the skin.

Novel phytochemicals have been found in erva tostão, including flavonoids, steroids and alkaloids, many of which drive its documented biological activities. Several research groups studying various biological activities of erva tostão have indicated no toxicity of root and leaf extracts ingested by mice up to 5 g per kg of body weight.[1,2] Others have indicated the maximum tolerated dosage of root extracts injected into mice to be approximately 1 g per kg of body weight.[3] Yet another group of scientists studied the effects of erva tostão on pregnant rats and reported that it had no abortive effects and no embryotoxic or teratogenic (fetal change/birth defect) activity.[4]

Erva tostão has long been used in traditional medicine systems as a diuretic for many types of kidney and urinary disorders. The diuretic action of erva tostão has been studied and validated by scientists in several studies. Researchers showed (in the mid-1950s) that low dosages (10 mg/kg to 300 mg/kg) produced strong diuretic effects, while higher dosages (>300 mg/kg) produced the opposite effect—reducing urine output.[5] Later research verified these diuretic and antidiuretic properties, as well as the beneficial kidney and renal effects of erva tostão in animals and humans.[6–10] Research indicates that a root extract can increase urine output by as much as 100% in a 24-hour period at dosages as low as 10 mg/kg of body weight.[6]

The worldwide use of erva tostão for various liver complaints and disorders was validated in three separate studies. These indicate that a root extract provides beneficial effects for the liver in animals, protecting the liver from numerous introduced toxins and repairing chemical-induced liver damage.[2,10,11] In other clinical studies with animals, erva tostão extracts demonstrated smooth muscle and skeletal muscle stimulant activities in frogs and guinea pigs;[12] anti-inflammatory actions in rats;[6] hypotensive actions in dogs as well as *in vitro* hypotensive actions;[12] antispasmodic actions in frogs and guinea pigs;[3,12] analgesic activities in mice;[1] antiamoebic actions in rats;[13] and hemostatic, antihemorrhaging and anti-fibrinolytic properties in monkeys with IUDs.[14,15] The traditional use of erva tostão for convulsions was verified by scientists in two studies, demonstrating that a root extract provided anticonvulsant actions in mice.[16,17] *In vitro* testing of erva tostão confirmed its antibacterial properties against gonorrhea (another traditional use), and *Bacillus*, *Pseudomonas*, *Salmonella* and *Staphylococcus*.[18–20] It was also shown to possess antiviral actions against several viral plant pathogens.[21]

Many of these animal studies help to explain erva tostão's long history of different uses in natural medicine. Clearly it has played an important role in the herbal practitioner's medicine chest of natural remedies. It is an effective natural remedy for the liver and kidneys that is deserving of much more attention and use here in the United States.

Documented Properties and Actions: Analgesic, anthelmintic, antiamoebic, antibacterial, anticonvulsant, antidiuretic, antifibrinolytic, anti-inflammatory, antiproliferative, antispasmodic, antiviral, choleretic, depurative, diuretic, hemostatic, hepatoprotective, hepatotonic, hypotensive, immunomodulator, lactagogue, laxative, vermifuge

Phytochemicals: Alanine, arachidic acid, aspartic acid, behenic acid, boeravinone A thru F, boerhaavic acid, borhavine, borhavone, campesterol, daucosterol, ecdysone, flavones, galactose, glutamic acid, glutamine, glycine, hentriacontane, heptadecyclic acid, histidine, hypoxanthine, liriodendrin, oleaic acid, oxalic acid, palmitic acid, proline, punarnavine, serine, sitosterols, stearic acid, stigmasterol, syringaresinol, threonine, triacontan, ursolic acid, valine

Traditional Remedy: For a general liver tonic; one cup of a whole herb decoction once daily or 1–2 ml of a 4:1 tincture twice daily.

Contraindications:

- Both *in vivo* and *in vitro* studies have demonstrated the hypotensive properties of erva tostão. Those with heart problems such as low blood pressure, or those taking medications to lower their blood pressure should not use this plant without the advice and supervision of a qualified health care practitioner.
- This herb has demonstrated myocardial depressant activity[12] and should therefore not be taken by anyone with heart failure or those taking heart depressant medications unless under the direction and care of a qualified health care practitioner.

Drug Interactions:

- May interfere with prescription diuretics.
- May potentiate alpha-adrenergic medications.
- May potentiate cardiac depressant medications.
- Erva tostão has been documented in one study to have angiotensin-converting enzyme (ACE) inhibition action.[22] Therefore, this plant may potentiate ACE inhibitor drugs for high blood pressure.
- In one study, a dosage of 500 mg/kg intragastrically in mice inhibited barbiturates and decreased sleeping time.[1] Therefore the use of this plant may decrease the effect of barbiturates.

WORLDWIDE ETHNOBOTANICAL USES

Country	Uses
Brazil	Albuminuria, beri-beri, blennorrhagia, calculi, cholagogue, cystitis, diuretic, gallbladder, guinea worms, hepatitis, hepatoprotective, hepatotonic, hydropsy, hypertension, jaundice, kidney disorders, liver disorders, nephritis, renal, sclerosis (liver), snakebite, spleen (enlarged), urinary disorders, urinary retention
Guatemala	Erysipelas, guinea worms
India	Abdomen, abdominal pain, anemia, anthelmintic, anti-inflammatory, ascites, asthma, blood purifier, calculi, cancer (abdominal), cataract, childbirth, cholera, cough, debility, diuretic, dropsy, dyspepsia, edema, emetic, expectorant, eye, fever, food, gonorrhea, guinea worms, heart ailments, heart disease, hemorrhages (childbirth), hemorrhages (thoracic), hemorrhoids, hepatoprotective, inflammation (internal), jaundice, kidney disorders, lactagogue, laxative, liver disorders, menstrual, ophthalmic, renal, rheumatism, snakebite, spleen (enlarged), stomachic, urinary disorders, weakness
Iran	Appetite stimulant, diuretic, edema, expectorant, flatulence, gonorrhea, jaundice, joint pain, lumbago, nephritis, tonic, urticaria
Nigeria	Abscess, anticonvulsant, asthma, boil, convulsions, emetic, epilepsy, expectorant, febrifuge, guinea worms, laxative
West Africa	Abortifacient, aphrodisiac, dysmenorrhagia, guinea worms, menstrual regulator
Elsewhere	Childbirth, guinea worms, jaundice, sterility, yaws

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Ethnomedical Information on Erva Tostâo (Boerhaavia diffusa)

Plant Part / Location	Documented Ethnic Use	Type Extract / Route	Used For	Ref #
Root Angola	Used for jaundice.	Not Stated	Human Adult	N02475
Entire Plant Brazil	Used as a diuretic, for urinary disorders, for hepatitis, jaundice, gallstones, urinary disorders, albuminuria, urinary retention, beri beri and blenorrhagia.	Hot H2O Ext / Oral	Human Adult	ZZ1013
Root Brazil	Used for renal disorders, urinary disorders, nephritis, cystitis, abundant urine, ascites, urinary retention, albuminuria, liver disorders and jaundice.	Hot H2O Ext / Oral	Human Adult	ZZ1007
Root Ghana	Used for guinea worms (used as a poultice). Used for guinea worms. Used of the treatment of yaws.	Hot H2O Ext / External Hot H2O Ext / External Not Stated	Human Adult Human Adult Human Adult	W00113 M23617 N02475
Entire Plant Guinea	Used to assist difficult childbirth.	Hot H2O Ext / Oral	Human (pregnant)	A00455
Entire Plant India	Used to increase the quantity of milk (galactagogue). Used as a diuretic, stomachic, laxative, anti-inflammatory, emmenagogue, and emetic (large doses). Used to treat gonorrhea, internal inflammation, dropsy, jaundice, ascites, hemorrhoids, menstrual troubles, anemia, weakness, edema, heart diseases, and renal or urinary calculi.	Plant / Oral Hot H2O Ext / Oral	Cow / Female Human Adult	W03073 A12577 A14886 J05221 J08439 K23171 M26677 T06479 T08282 T09394 T13960 T15475
Leaf India	Used to cure rheumatic pains. Cooked leaves used for jaundice Used for dyspepsia, jaundice, enlarged spleen, abdominal pain, and liver diseases.	Leaves / External Leaves / Oral Hot H2O Ext / Oral Leaves / Oral	Human Adult Human Adult Human Adult Human Adult	T15942 M27166 M26677 T10133 T13856

Plant Part / Location	Documented Ethnic Use	Type Extract / Route	Used For	Ref #
Leaf Juice India	Used for snakebite. Used in ophthalmia. Used for cataracts. Used as an antivenin for snakebite.	Leaf Juice / Oral Juice / Ophthalmic Juice / Ophthalmic Not stated	Human Adult Human Adult Human Adult Human Adult	K23156 M22542 M23219 K25892
Fresh Leaf India	Used as food. Used for urinary complaints. Used for cataracts.	Leaves / Oral Leaves / Oral Juice / Ophthalmic	Human Adult Human Adult Human Adult	K26667 T08282 T08282
Root India	Used as a diuretic. Used for fevers. Used as an expectorant in asthma, as a laxative, diuretic. Used for abdominal cancer. Used for sores. Lukewarm root paste is applied. Used for patients showing the symptoms of cholera. Used for asthma, anemia, snakebite jaundice and laxative. Used as a blood purifier and to hasten delivery. Used as an anthelmintic, laxative, diuretic and expectorant. Used as a laxative and diuretic. Used to facilitate expulsion of the placenta. Used for heart disease and kidney disease. Used for boils and guinea-worms. Used as a diuretic. Used for gonorrhea and dropsy. Used for coughs, hemorrhages, colic and abdominal pain. Fresh root used for jaundice.	Hot H2O Ext / Oral Hot H2O Ext / Oral Hot H2O Ext / Oral Root / External Root / External Root(syrup) / Oral Hot H2O Ext / Oral Powder / Oral Root / Oral Hot H2O Ext / Oral Decoction / Oral Hot H2O Ext / Oral Root / External Decoction / Oral Root / Oral Hot H2O Ext / Oral Root / Oral	Human Adult Human Adult Human Adult Human Adult Human Adult Human Adult Human Adult Human Adult Cow Human Adult Human Adult Human Adult Human Adult Human Adult Human Adult Human Adult Human Adult	A06589 T00583 A11384 A11384 K23294 K23171 M06281 M22542 W03073 N15507 T09390 T10133 T10133 M31122 T10133 T15475 K25403
Part Not Stated India	Used as a diuretic, for kidney ailments, heart problems, abdomen ailments and for debility. Used for menstrual complaints.	Decoction / Oral Hot H2O Ext / Oral	Human Adult Human Adult	K29697 T00653
Entire Plant Iran	Used as a diuretic and to treat gonorrhea, nephritis, and edema.	Decoction / Oral	Human Adult	I00004
Leaf Iran	Used as an appetite stimulant and for joint pain.	Infusion / Oral	Human Adult	I00004
Root Iran	Used as a diuretic, expectorant, emetic (high doses), jaundice, urticaria, and edema.	Decoction / Oral	Human Adult	I00004
Seed Iran	Used for its tonic effect, for lumbago, muscle pain, and flatulence, and as an expectorant.	Not Stated / Oral	Human Adult	I00004

Plant Part / Location	Documented Ethnic Use	Type Extract / Route	Used For	Ref #
Entire Plant Nigeria	Used as a febrifuge and laxative for children.	Hot H2O Ext / Oral	Human Child	N02475
Leaf Nigeria	Used as an anticonvulsant, antiasthmatic, expectorant, and emetic.	Hot H2O Ext / Oral	Human Adult	T06510
Fresh Root Nigeria	Used for convulsions. Fresh root used as an emetic and expectorant, used to treat epilepsy and asthma.	Hot H2O Ext / Oral H2O Ext / Oral	Human Child Human Adult	K11896 N02475
Petiole Nigeria	Used for abscesses and boils.	Decoction / External	Human Adult	K16264
Root Papua - New Guinea	Used to induce sterility in women.	Decoction / Oral	Human Adult	K25334
Entire Plant West Africa	Used to regulate menstruation.	H2O Ext / Oral	Human Adult Female	A00115
Leaf West Africa	Used as an abortifacient.	Hot H2O Ext / Oral	Human (pregnant)	A04865
Root West Africa	Used for guinea worms. Used as a male aphrodisiac.	Hot H2O Ext / External Hot H2O Ext / Oral	Human Adult Human Adult	M23617 A04865

Presence of Compounds in Erva Tostâo (Boerhaavia diffusa)

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Alanine	Proteid	Root	India	Not stated	N05735
Arachidic Acid	Lipid	Root	Nepal	Not stated	H05892
Aspartic Acid	Proteid	Root Aerial Parts Root	India India India	Not stated Not stated Not stated	N05515 N05515 N05735
Behenic Acid	Lipid	Root	Nepal	Not stated	H05892
Boeravinone A	Flavonoid	Root Root	Japan Nepal	00.01042% 00.01041%	H04035 H05892
Boeravinone B	Flavonoid	Root Root	Japan Nepal	00.00342% 00.00341%	H04035 H05892
Boeravinone C	Flavonoid	Root Root Root	Nepal Nepal Japan	Not stated Not stated 00.01075%	H04332 H07130 H04035
Boeravinone D	Flavonoid	Root	Nepal	00.00014%	H08171
Boeravinone E	Flavonoid	Root	Nepal	00.001%	H08171
Boeravinone F	Flavonoid	Root	Nepal	00.00037%	H08171
Boerhaavia Diffusa Virus Inhibitor	Proteid	Root	India	Not stated	N05735
Boerhaavic Acid	Alkene	Entire Plant	India	Not stated	A12577
Borhavine	Xanthone	Root	India	00.01%	H11420
Borhavone	Flavonoid	Root	India	Not stated	H11420
Campesterol	Steroid	Root	Nepal	Not stated	H05892
Daucosterol	Steroid	Root	Nepal	Not stated	H05892
Ecdysone,beta	Steroid	Root	India	00.05%	N15507

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Flavone, 5-7-dihydroxy-3'-4'-dimethoxy-6-8-dimethyl	Flavonoid	Root	India	00.02000%	M06281
Fructose	Carbohydrate	Root	India	Not stated	A11384
Galactose	Carbohydrate	Root	India	Not stated	N05735
Glucose	Carbohydrate	Root Root	India India	Not stated Not stated	N05735 A11384
Glutamic Acid	Proteid	Root Aerial Parts	India India	Not stated Not stated	N05515 N05515
Glutamine	Proteid	Root	India	Not stated	N05735
Glycerol	Lipid	Root	Not stated	00.04166%	M27372
Glycine	Proteid	Root	India	Not stated	N05735
Hentriacontane, n	Alkane	Root	India	Not stated	A11384
Heptadecyclic Acid	Lipid	Root	Nepal	Not stated	H05892
Histidine	Proteid	Root	India	Not stated	N05735
Hypoxanthine-9-l-arabinofuranoside	Alkaloid	Entire Plant Root Root	Pakistan Nigeria (cult) Nigeria	Not stated Not stated Not stated	A11493 T11238 N17896
Kno3	Inorganic	Entire Plant	India	00.52%	A11787
Leucine	Proteid	Root	India	Not stated	N05735
Liriodendrin	Lignan	Root	Not stated	00.00508%	M27372
Methionine	Proteid	Root	India	Not stated	N05735
Oleaic Acid	Lipid	Root	Nepal	Not stated	H05892
Oxalic Acid	Alkane to C4	Aerial Parts	Australia	Not stated	W04281
Palmitic Acid	Lipid	Root	Nepal	Not stated	H05892
Proline	Proteid	Root	India	Not stated	N05735

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Proline, hydroxy	Proteid	Root	India	Not stated	N05735
Punarnavine	Alkaloid-misc	Root Entire Plant Entire Plant	India India India	Not stated 00.01% 00.04%	K22122 A11507 W00156
Serine	Proteid	Root	India	Not stated	N05735
Sitosterol Oleate	Steroid	Root	Nepal	Not stated	H05892
Sitosterol Palmitate	Steroid	Root	Nepal	Not stated	H05892
Sitosterol, beta	Steroid	Root Entire Plant Root Root	India India India Nepal	Not stated 00.01% Not stated Not stated	N15507 A14886 A11384 H05892
Stearic Acid	Lipid	Root	Nepal	Not stated	H05892
Stigmasterol	Steroid	Root	Nepal	Not stated	H05892
Sucrose	Carbohydrate	Root Root	Not stated India	00.15% Not stated	M27372 A11384
Syringaresinol-mono-beta-d-glucoside	Lignan	Root	Not stated	00.00166%	M27372
Threonine	Proteid	Root	India	Not stated	N05735
Triacontan-1-ol	Alkane	Root	India	Not stated	N15507
Tyrosine	Proteid	Root	India	Not stated	N05735
Ursolic Acid	Triterpene	Root	India	Not stated	A11384
Valine	Proteid	Root	India	Not stated	N05735
Xylose	Carbohydrate	Root	India	Not stated	N05735

Other Phytochemical Screening:

Alkaloids Absent	Entire Plant	T09394
	Leaf	M15159
	Twig	M15159
	Root	M15159
	Stem	W00233
	Fruit	M15310
	Aerial Parts	M15415
Alkaloids Present	Entire Plant	M05447
	Entire Plant	A11787
	Shoots	M15310
	Flowers	M15310
Anthocyanins Absent	Stem	W00233
Bufadienolides Absent	Stem	W00233
Cardenolides Absent	Stem	W00233
Flavonoids Absent	Stem	W00233
Triterpenes Present	Stem	W00233
Flavonoids Present	Shoots	M15310
	Flowers	M15310
	Fruit	M15310
	Aerial Parts	M15415
Pyrrolizidine Alkaloids Absent	Entire Plant	T09394
Quinones Absent	Stem	W00233
Saponins Absent	Stem	W00233
	Flowers	M15310
	Fruit	M15310
Saponins Present	Shoots	M15310
	Aerial Parts	M15415
Sterols Present	Stem	W00233
	Entire Plant	M05447
Tannins Absent	Aerial Parts	M15415
Tannins Present	Stem	W00233

Biological Activities for Extracts of Erva Tostâo (Boerhaavia diffusa)

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Entire plant India	Toxicity assessment (Quantitative)	ETOH - H2O (1:1) Ext	IP Mouse	1.0 gm/kg		Maximum tolerated dose	A03335
Entire plant India	Toxic effect (General)	ETOH - H2O (1:1) Ext	Intragastric Mouse	2000 mg/kg	Inactive		M26677
Root India	Toxicity Assessment (Quantitative)	ETOH - H2O (1:1) Ext	IP Mouse	1.0 gm/kg		Maximum tolerated dose.	A03335
Leaf Brazil	Toxicity (General)	Decoction	Oral Mice	5000 mg/kg	Inactive		AJ1003
Leaf Juice Brazil	Toxicity (General)	Juice Ext	Oral Mice	5000 mg/kg	Inactive		AJ1003
Root Nigeria	Toxicity Assessment (Quantitative)	H2O Ext	IP Mouse	LD50: 298.0 mg/kg			K11896
Root India	Uterine Stimulant Effect	ETOH - H2O (1:1) Ext	Rat Female	Not stated	Inactive	Uterus (estrogenic)	A03335
Entire plant India	Uterine Stimulant Effect	ETOH-H2O (1:1) Ext	Rat Female	Not stated	Inactive	Uterus (estrog)	A03335
Root India	Embryotoxic Effect	ETOH (70%) Ext	Intragastric Rat (pregnant)	250.0 mg/kg	Inactive		M31122
Root India	Teratogenic Activity	ETOH (70%) Ext	Intragastric Rat (pregnant)	250.0 mg/kg	Inactive		M31122
Entire plant India	Barbiturate Inhibition	ETOH - H2O (1:1) Ext	Intragastric Mouse	500.0 mg/kg	Active	Barbiturate sleeping time decreased.	M26677
Leaf Brazil	Barbiturate Potentiation	Decoction	IP Mice	1000 mg/kg	Inactive	Did not alter sleeping time.	AJ1003
Leaf Juice Brazil	Barbiturate Potentiation	Juice Ext	IP Mice	1000 mg/kg	Inactive	Did not alter sleeping time.	AJ1003
Root India	Hypotensive Activity	H2O Ext	IV Dog	0.02 ml/kg	Active		T15202
Root India	Hypotensive Activity	MEOH Ext	IV Dog	0.02 ml/kg	Active	Effect blocked by atropine, but not by propranolol or mepyramine. Reported biological activity is highly dose-dependent.	T12052

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Root India	Myocardial Depressant Activity	MEOH Ext	Frog Heart	0.1 ml	Active	Effect blocked by atropine. Reported biological activity is highly dose-dependent.	T12052
Root India	Cardiotonic Activity	ETOH-H2O (1:1) Ext	Perfusion Guinea Pig	Not stated	Active	Heart	A03335
Entire plant India	Anticoagulant activity	ETOH-H2O (1:1) Ext	Intragastric Rat	500.0 mg/kg	Active	Prothrombin time decreased. Dose was given daily for 5 days. Vs.ccl4-induced hepatotoxicity.	M26677
Not stated India	Hemostatic Activity	Not stated	Vaginal Monkey	Not stated	Active	Aids in Arresting IUCD-induced Bleeding	T01268
Root India	Antihemorrhagic Activity	Not stated	Monkey	Not stated	Active	Reduced duration of menstrual flow (124%), menstrual iron loss (120.8%) and uterine tissue plasminogen activator (272%) in IUD-fitted monkeys	AJ1006
Root India	Antihemorrhagic Activity	Not stated	Monkey	Not stated	Active	Reduced stromal edema, inflammation, tortuosity of glands and increased deposition of fibrin and platelets in the vessel lumen of the endometrium of monkeys fitted with IUD's.	AJ1007
Root India	Angiotensin-Converting Enzyme Inhibition	Acetone Ext	Not stated	25.0 mcl	Weak Activity	3.0% Inhibition	K26414
Root India	Angiotensin-Converting Enzyme Inhibition	ETOH (95%) Ext	Not stated	25.0 mcl	Weak Activity	5.0% Inhibition	K26414
Root India	Angiotensin-Converting Enzyme Inhibition	H2O Ext	Not stated	25.0 mcl	Active	40% Inhibition	K26414
Root Nepal	Adrenergic Receptor Blocker (alpha-2)	MEOH Ext	Not stated	Not stated	Active		H05892
Root India	Antiproliferative Activity	ETOH Ext	Not stated	Not stated	Active		AJ1001
Root India	Antiphage Activity	H2O Ext	Intraportal	Not stated	Inactive	Bacteriophage M-12 vs. plaque formation	M16847

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Root India	Antiphage Activity	H2O Ext	Intraportal	Not stated	Inactive	Bacteriophage PP-7 vs. plaque formation	M16847
Root India	Antiphage Activity	H2O Ext	Intraportal	Not stated	Weak Activity	Bacteriophage Q-beta vs. plaque formation	M16847
Root India	Cholinesterase Inhibition	H2O Ext	Not stated	Not stated	Active		T15202
Not stated India	Diuretic Activity	Powder * Oral	Human Adult	1.5 gm/lb	Inactive	Forty patients with nephrotic syndrome were treated with fresh powdered drug for one month. The extract increased serum protein levels, reduced urinary protein excretion and increased the level of immunoglobulins and lowered immunecomplex.	K29697
Entire plant India	Diuretic activity	Not stated	Toad (*Thermobia domes*)	Variable	Active	Depressed tubular excretion of phenol. Inhibited succinic dehydrogenase in kidney, but had a stimulatory effect with lower doses. It depressed kidney tissue slice respiration,but had no effect on kidney phosphatase. It stimu-lated the activity of kidney D-amino oxidase.	A11491
Aerial parts India	Diuretic activity	ETOH	Oral Rat	0.4 ml/kg	Weak activity	Activity was increased when the dosage was halved and combined with *Phyllanthus niruri* extract	J12663
Not stated India	Diuretic Activity	Powder	Intragastric Rat (Male)	1.0 ml	Active	Kidney	K29697
Root India	Diuretic Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Active	Increased 24 Hr Urine output 100%	J08439
Stem India	Diuretic Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Inactive	Increased 24 Hr Urine out Put ca 15%	J08439
Entire plant India	Antidiuretic activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Active	Decreased 24 hr urine output by 30%	J08439

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Flower + leaf India	Antidiuretic activity	ETOH (95%) Ext	IP Rat	300 mg/kg	Active	Decreased 24 hr urine output by 50%	J08439
Entire plant India	Diuretic activity	Pet ether Ext	Oral Rat	ED50 = 250 mg/kg	Active		J05221
Root India	Hepatoprotective Activity	H2O Ext	Rat	2 ml/kg	Active	In thioacetamide intoxicated rats the extract protected serum parameters GOT, GPT, ACP and ALP.	AJ1010
Entire plant India	Antihepatotoxic activity	ETOH - H2O (1:1) ext	Intragastric Mouse	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity. Reversed increases in glutamate pyruvate transaminase, glutamate oxylate transaminase and bilirubin.	M26677
Entire plant India	Glutamate-oxalo-acetate-transaminase inhibition	ETOH - H2O (1:1) Ext	Intragastric Rat	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity.	M26677
Entire plant India	Glutamate-pyruvate-transaminase inhibition	ETOH - H2O (1:1) Ext	Intragastric Mouse	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity.	M26677
Entire plant India	Glutamate-pyruvate-transaminase inhibition	ETOH - H2O (1:1) Ext	Intragastric Rat	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity.	M26677
Entire plant India	Hepatotonic Activity	ETOH - H2O (1:1) Ext	Intragastric Rat	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity. Plasma bilirubin decreased.	M26677
Not stated India	Antihepatotoxic Activity	Not stated	IP Rat	Not stated	Active	vs. mercuric chloride induced hepatotoxicity. Liver showed an increased mitotic index and acceleration of tubular repair.	K07546
Leaf Nigeria	Anticonvulsant Activity	ETOH (70%)Ext	IP Mouse	2.0 gm/kg	Active	vs. metrazole-induced convulsions.	T06510
Leaf Nigeria	Anticonvulsant Activity	ETOH (70%) Ext	IP Mouse	Variable	Inactive	vs. strychnine-induced convulsions	T06510
Root Nigeria	Anticonvulsant Activity	MEOH Ext	IP Mouse	1.5 gm/kg	Active	vs metrazol-induced convulsions	N02475

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Root Nigeria	Anticonvulsant Activity	H2O Ext	IP Mouse	ED50: 126 mg/kg	Active	vs. electroshock-induced convulsions	K11896
Root Nigeria	Anticonvulsant Activity	H2O Ext	IP Mouse	ED50: 251 mg/kg	Weak Activity	vs. pentylenetetrazole-induced convulsions	K11896
Root India	Skeletal Muscle Stimulant Activity	MEOH Ext	Frog	0.25 ml	Active	Muscle (*Rectus abdominus*)	T12052
Root India	Smooth Muscle Stimulant Activity	MEOH Ext	Guinea Pig ileum	0.05 ml	Active	Effect blocked by atropine.	T12052
Root India	Antispasmodic Activity	ETOH - H2O (1:1) Ext	Guinea Pig ileum	Not stated	Active	vs. ACH- and histamine-induced spasms.	A03335
Entire plant India	Antispasmodic Activity	ETOH - H2O (1:1) Ext	Guinea Pig ileum	Not stated	Active	vs. ACH- and histamine-induced spasms.	A03335
Root India	Spasmogenic Activity	H2O Ext	Frog	Not stated	Active	Muscle (*Rectus abdominus*)	T15202
Root India	Spasmogenic Activity	H2O Ext	Guinea Pig	Not stated	Active	Ileum	T15202
Leaf + root + seed India	Anti-inflammatory Activity	Not stated	Oral Human Adult	Variable	Active		T06320
Entire plant India	Anti-inflammatory Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Active	vs carrageenin-induced pedal edema. Paw volume decreased 44%	J08439
Flower + leaf India	Anti-inflammatory Activity	ETOH (95%) Ext	IP Rat	300 mg/kg	Active	vs carrageenin-induced pedal edema. Paw volume decreased 52%	J08439
Root India	Anti-inflammatory Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Active	vs. carrageenin-induced pedal edema decreased paw volume 52%	J08439
Stem India	Anti-inflammatory Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Weak Activity	vs. carrageenin-induced pedal edema paw volume decreased 16%	J08439
Leaf Brazil	Anti-inflammatory Effect	Decoction Leaf Juice	Oral Mouse	Not stated	Inactive	No effect on carrageenan-induced paw edema. P > 0.05	AJ1003

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Leaf Brazil	Analgesic Effect	Decoction	Oral Mouse	1000 mg/kg	Active Weak Activity	vs. acetic acid-induced writhing. demonstrated 47% inhibition. Thermal hot-plate writhing test.	AJ1003
Leaf Juice Brazil	Analgesic Effect	Juice Ext	Oral Mouse	1000 mg/kg	Active Strong Activity	vs. acetic acid-induced writhing demonstrated 50% inhibition. Thermal hot-plate writhing test.	AJ1003
Twig India	Antipyretic Activity	Not stated	Intragastric Rat	Not stated	Weak Activity	Vs.pyrexia Induced by Subcutaneous Injection of Yeast	A14888
Not stated India	Immunostimulatory Effect	Alkaloid Fraction	Mice	25-100 mg/kg	Active	Inhibited SRBC-induced delayed hypersensitivity reactions during post-immunization drug treatment. An increase in antibody titre was observed during pre- and post-immunization treatment.	AJ1004
Root India	Immunosuppressive Activity	ETOH Ext	In vitro	Not stated	Active	Inhibited human NK cell cyto-toxicity, production of NO in mouse macrophage cells, IL-2 and TNF-alpha in human PBMCs. No effect on IFN-gamma, cell surface markers CD16, CD25 and HLA-DR.	AJ1001
Not stated India	Blastogenic Activity	Alkaloid Fraction	Mice	25-100 mg/kg	Inactive	No blastogenic response of murine splenocytes to Concanvalin A and lipopolysaccharide.	AJ1004
Not stated India	Mitogenic Activity	Alkaloid Fraction	Mice	25-100 mg/kg	Inactive		AJ1004
Entire plant India	Cytotoxic activity	ETOH - H2O (1:1) Ext	Cell culture	ED50: > 20.0 mcg/ml	Inactive	Ca-9kb	A03335
Root India	Cytotoxic Activity	ETOH - H2O (1:1) Ext	Cell Culture	ED50: > 20.0 mcg/ml	Inactive	Ca-9kb	A03335
Root Nepal	Cytotoxic Activity	Ether Ext	Cell Culture	Not stated	Active	HeLa-S3 Cells	H05892

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Root India	Antiproliferative Activity	ETOH Ext	Cell culture	Not stated	Active	Inhibited mitogenic T-cell proliferation of human peripheral blood mononuclear cells (PBMC). Inhibited antigen-stimulated PBMC proliferation. Inhibited the growth of mouse and human macrophage cells, mouse fibroblast cells, human embryonic kidney cells, mouse liver cells, monkey kidney cells, mouse lymphoma cells, human erythroleukemic cells and human T cells.	AJ1002
Root India	Antiviral Activity	H2O Ext	Not stated	Undiluted	Active	*Gomphrena mosaic virus* *Sunnhemp rosette virus* *Tobacco mosaic virus* *Tobacco ring spot virus*	N02873
Aerial parts Iran	Antibacterial Activity	ETOH (80%) Ext	Agar plate	100.0 mcg/ml	Active Active Active	*Pseudomonas aeruginosa* *Salmonella paratyphi A* *Staphylococcus aureus*	T09667
Entire plant India	Antibacterial Activity	H2) Ext	Agar Plate	30-40 mg/ml	Active	*Aeromonas hydrophilla* *Bacillus cerues.*	AJ1012
Aerial parts Iran	Antibacterial Activity	ETOH (80%) Ext	Agar plate	100.0 mcg/ml	Inactive	*Bacillus anthracis* *Escherichia coli* *Klebsiella pneumoniae* *Proteus vulgaris* *Shigella sonnei* *Vibrio cholera*	T09667
Petiole Nigeria	Antibacterial Activity	H2O Ext	Agar Plate	Not stated	Active	*Clostridium botulinum* *Corynebacterium diphtheriae* *Salmonella typhimurium*	K16264
Petiole Nigeria	Antibacterial Activity	ETOH (40%) Ext	Agar Plate	Not stated	Active Weak Activity	*Clostridium botulinum* *Clostridium tetani*	K16264
Petiole Nigeria	Antibacterial Activity	ETOH (40%) Ext H2O Ext	Agar Plate	Not stated	Equivocal	*Neisseria gonorrhea*	K16264

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Entire plant Nigeria	Antibacterial activity	MEOH Ext	Agar plate	2.0 mg/ml	Inactive	*Corynebacterium diphtheriae* *Neisseria species* *Pseudomonas aeruginosa* *Salmonella species* *Staphylococcus aureus* *Streptobacillus species* *Streptococcus species*	M27767
Petiole Nigeria	Antibacterial Activity	ETOH (40%) Ext H2O Ext		Not stated	Inactive	*Staphylococcus aureus*	K16264
Petiole Nigeria	Antibacterial Activity	ETOH (40%) Ext	Agar Plate	Not stated	Inactive	*Salmonella typhimurium* *Bacillus subtilis* *Bacteroides fragilis* *Bacteroides melaninogenicus* *Corynebacterium diphtheriae* *Escherichia coli* *Klebsiella pneumoniae* *Proteus vulgaris* *Pseudomonas pyocyanae* *Yersinia pseudotuberculosis*	K16264
Petiole Nigeria	Antibacterial Activity	H2O Ext	Not stated	Not stated	Inactive	*Staphylococcus aureus*	K16264
Petiole Nigeria	Antibacterial Activity	H2O Ext	Agar Plate	Not stated	Inactive	*Bacillus subtilis* *Bacteroides fragilis* *Bacteroides melaninogenicus* *Clostridium tetani* *Proteus vulgaris* *Escherichia coli* *Klebsiella pneumoniae* *Pseudomonas pyocyanae* *Yersinia pseudotuberculosis*	K16264
Not stated Nigeria	Antifungal Activity	Not stated	Agar Plate	Not stated	Inactive		AJ1008
Not stated India	Antifungal Activity	Not stated	Agar Plate	Not stated	Weak Activity	*Microsporum gypseum* *Chrysosporium tropicum* *Trichophyton terrestre*	AJ1005
Root Sri Lanka	Nematocidal Activity	Decoction	Not stated	10.0 mg/ml	Inactive	*Toxocara canis*	M26175
Leaf India	Antinematodal activity	H2O Ext	Not stated	Variable	Active	*Meloidogyne incognita*	T07251
Leaf India	Antiamebic Activity	ETOH (80%) Ext	Not stated	MIC >1000 mcg/ml	Inactive	*Entamoeba histolytica*	K19310

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Not stated India	Antiamebic Activity	ETOH (80%) Ext	Intragastric Rat	250.0 mg/kg	Weak Activity	*Entamoeba histolytica*	K19310
Root India	Antiamebic Activity	ETOH (80%) Ext	Intragastric Rat	500.0 mg/kg	Active	*Entamoeba histolytica*	K19310
Root India	Insecticide Activity	Butanol Ext	Not stated	Not stated	Active	*Musca domestica*	N15507
Root Nigeria	Molluscicidal Activity	MEOH Ext	Not stated	100.0 ppm	Inactive	*Bulinus globosus*	T04176
Not stated India	Alpha-Amylase Inhibitory Activity	ETOH Ext	In vitro	Not stated	Inactive		AJ1011

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M15415	SURVEY OF IRANIAN PLANTS FOR SAPONINS, ALKALOIDS, FLAVONOIDS AND TANNINS. III. AYNEHCHI,Y: SALEHI SORMAGHI,MH: AMIN,GH: KHOSHKHOW,M: SHABANI,A: INT J CRUDE DRUG RES 23 1: 33-41 (1985)(DEPT PHARMACOGNOSY SCH PHARM UNIV TEHRAN TEHRAN IRAN)
M16847	EFFECT OF ROOT EXTRACT FROM BOERHAAVIA DIFFUSA L., CONTAINING AN ANTIVIRAL PRINCIPLE UPON PLAQUE FORMATION OF RNA BACTERIOPHAGES. AWASTHI,IP: MENZEL,G:ZENTRALBL MIKROBIOL 141 5: 415-419 (1986)(DEPT GENET PLANT BREED NARENDRA DEV UNIV AGR FAIZABAD UP INDIA)
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M23219	A SURVEY OF MEDICINAL PLANTS OF CHENCHU TRIBES OF ANDHRA PRADESH, INDIA. REDDY,MB: REDDY,KR: REDDY,MN: INT J CRUDE DRUG RES 26 4: 189-196 (1988)(DEPT BOT SRI VENKATESWARA UNIV TIRUPATI AP 517 502 INDIA)
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M26175	SCREENING OF CRUDE DRUGS USED IN SRI LANKA FOR NEMATOCIDAL ACTIVITY ON THE LARVA OF TOXOCARIA CANIS. KIUCHI,F: HIOKI,M: NAKAMURA,N: MIYASHITA,N: TSUDA,Y: KONDO,K: SHOYAKUGAKU ZASSHI 43 4: 288-293 (1989)(FAC PHARM SCI KANAZAWA UNIV KANAZAWA 920 JAPAN)
M26677	BOERHAAVIA DIFFUSA: A STUDY OF ITS HEPATOPROTECTIVE ACTIVITY. CHANDAN,BK: SHARMA,AK: ANAND,KK: J ETHNOPHARMACOL 31 3: 299-307 (1991)(REGIONAL RESEARCH LAB JAMMU TAWI J & K 180 001 INDIA)
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M27372	CONSTITUENTS OF THE ROOTS OF BOERHAAVIA DIFFUSA L. III. IDENTIFICATION OF CA2 CHANNEL ANTAGONISTIC COMPOUND FROM THE METHANOL EXTRACT. LAMI,N: KADOTA,S: KIKUCHI,T: MOMOSE,Y: CHEM PHARM BULL 39 6: 1551-1555 (1991)(RES INST ORIENTAL MED TOYAMA MED & PHARM UNIV TOYAMA 930-01 JAPAN)

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N02873	ANTIVIRAL ACTIVITY OF BOERHAAVIA DIFFUSA ROOT EXTRACT AND PHYSICAL PROPERTIES OF THE VIRUS INHIBITOR. VERMA,HN: AWASTHI,LP:CAN J BOT 57 : 926-932 (1979)(DEPT BOTANY PLANT VIRUS LAB LUCKNOW UNIV LUCKNOW UP 226007 INDIA)
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T00653	MEDICINAL PLANTS OF NETARHAT, BIHAR(INDIA).PAUL,SR:Q J CRUDE DRUG RES 15 : 79-97 (1979)(DIV PLANT TAXON & HERBARIUM NATIONAL BOTANIC GARDENS LUCKNOW UP INDIA)
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AJ1002	ANTILYMPHOPROLIFERATIVE ACTIVITY OF ETHANOLIC EXTRACT OF BOERHAAVIA DIFFUSA ROOTS. MEHROTRA,S: SINGH,VK: AGARWAL,SS: MAURYA,R: SRIMAL,RC: EXP MOL PATHOL. 72 3: 236-42 (2002)(SANJAY GANDHI POST GRADUATE INSTITUTE OF MEDICAL SCIENCES, LUCKNOW, INDIA)
AJ1003	THE JUICE OF FRESH LEAVES OF BOERHAAVIA DIFFUSA L. (NYCTAGINACEAE) MARKEDLY REDUCES PAIN IN MICE. HIRUMA-LIMA,CA: GRACIOSO,JS: BIGHETTI,EJ: GERMONSEN ROBINEOU,L: SOUZA BRITO,AR: J ETHNOPHARMACOL. 71 1-2: 267-74 (2000)(INST. BIOLOGIA E SAUDE PUBLICA, BRAZIL)
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AJ1010	HEPATOPROTECTIVE ACTIVITY OF BOERHAAVIA DIFFUSA L. ROOTS - A POPULAR INDIAN ETHNOMEDICINE. RAWAT, AK: MEHROTRA,S: TRIPATHI,SC: SHOME,U: J ETHNOPHARMACOL. 56 1: 61-6 (1997)(PHARMACOGNOSY LAB, NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW, INDIA)
AJ1011	EFFECT OF CERTAIN PLANT EXTRACTS ON ALPHA-AMYLASE ACTIVITY. PRASHANTH,D: PADMAJA,R: SAMIULLA,DS: FITOTERAPIA. 72 2: 179-81 (2001)(BIOASSAY UNIT, RESEARCH AND DEVELOPMENT CENTRE, NATURAL REMEDIES, BANGALORE, INDIA)
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Clinical Abstracts

Int Immunopharmacol 2002 Jun;2(7):987-96
Immunomodulation by ethanolic extract of Boerhaavia diffusa roots.
Mehrotra, S., et al.
We have earlier reported that ethanolic extract of Boerhaavia diffusa, a plant used in Indian traditional system of medicine, significantly inhibits the cell proliferation. This led us to evaluate the immunomodulatory properties of this plant extract on various in vitro tests such as human natural killer (NK) cell cytotoxicity, production of nitric oxide (NO) in mouse macrophage cells, RAW 264.7, interleukin-2 (IL-2), tumor necrosis factor-alpha (TNF-alpha), intracytoplasmic interferon-gamma (IFN-gamma) and expression of various cell surface markers on human peripheral blood mononuclear cells (PBMCs). Ethanolic extracts of B. diffusa roots inhibited human NK cell cytotoxicity in vitro, production of NO in mouse macrophage cells, IL-2 and TNF-alpha in human PBMCs. Intracytoplasmic IFN-gamma and cell surface markers such as CD16, CD25, and HLA-DR did not get affected on treatment with B. diffusa extract. Our study demonstrates immunosuppressive potential of ethanolic extract of B. diffusa.

J Ethnopharmacol 2000 Jul;71(1-2):267-74
The juice of fresh leaves of Boerhaavia diffusa L. (Nyctaginaceae) markedly reduces pain in mice. Hiruma-Lima, C. A., et al.
The decoction or juice of leaves of Boerhaavia diffusa L. (Nyctaginaceae) is used in Martinican folk medicine for its analgesic and anti-inflammatory properties. In the present investigation we studied the acute oral (p.o.) toxicity of a crude extract obtained from a lyophilized decoction (DE) and from the juice (JE) of fresh leaves. We observed no signs of toxicity up to the dose of 5000 mg/kg (p.o.) in mice. At the dose of 1000 mg/kg, neither extract altered sleeping time evoked by the administration of pentobarbital sodium (i.p.). The DE and JE of B. diffusa were assessed in standard rodent models of algesia and inflammation. We investigated the anti-nociceptive effect of DE and JE in chemical (acetic acid) and thermal (hot plate) models of hyperalgesia in mice. Dipyrone sodium (200 mg/kg), JE (1000 mg/kg) and DE at the same dose (p.o.), produced a significant inhibition of acetic acid-induced abdominal writhing in mice (100, 50 and 47% inhibition, respectively) when compared with the negative control ($P<0.001$). In the hot-plate test in mice, morphine and JE produced a sig-nificant increase in latency during the observation time. The DE, however, only raised the pain thresholds during the first period (30 min) of observation ($P<0.05$). The extracts of B. diffusa were also investigated for their anti-edematogenic effect on carrageenan-induced edema in mice. However, neither extract inhibited the paw edema induced in mice ($P>0.05$). In the acetic acid-induced abdominal writhing in mice, pre- treatment of the animals with naloxone (5 mg/kg, i.p.) significantly reversed the analgesic effect of morphine and JE but not that of DE. These data show that the active antinociceptive principle of B. diffusa is present mainly in the juice of fresh leaves and has a significant antinociceptive effect when assessed in these pain models. The mechanism underlying this analgesic effect of fresh leaves of B. diffusa remains unknown, but seems to be related to interaction with the opioid system.

Exp Mol Pathol 2002 Jun;72(3):236-42
Antilymphoproliferative activity of ethanolic extract of Boerhaavia diffusa roots.
Mehrotra, S., et al.
Extracts of plants have been widely evaluated for possible antiproliferative and anticarcinogenic properties. The antiproliferative activity of ethanolic extract of Boerhaavia diffusa, a plant used in traditional medicine, was evaluated in several cells. It inhibited T cell mitogen phytohemagglutinin and concanavalin A-stimulated proliferation of human peripheral blood mononuclear cells (PBMC). It also inhibited purified protein derivative antigen-stimulated PBMC

proliferation and human mixed lymphocyte culture. In addition, B. diffusa extract inhibited the growth of several cell lines of mouse and human origin, such as mouse macrophage cells (RAW 264.7), human macrophage cells (U937), human monocytic cells (THP-1), mouse fibroblast cells (L929), human embryonic kidney cells (HEK293), mouse liver cells (BNLCL.2), African green monkey kidney cells (COS-1), mouse lymphoma cells (EL-4), human erythroleukemic cells (K562), and human T cells (Jurkat). The present study has demonstrated the antiproliferative potential of ethanolic extract of B. diffusa in vitro.

J Ethnopharmacol 1999 May;65(2):125-31
Studies on the immunomodulatory effects of Boerhaavia diffusa alkaloidal fraction.
Mungantiwar, A. A., et al.
The alkaloidal fraction of Boerhaavia diffusa was studied for its effect on cellular and humoral functions in mice. Oral administration of the fraction (25-100 mg/kg) significantly inhibited SRBC-induced delayed hypersensitivity reactions in mice. However, the inhibition was observed only during post-immunisation drug treatment, while no effect during pre-immunisation drug treatment was observed. A significant dose-related increase in antibody titre was observed during pre- and post-immunisation treatment. The alkaloidal fraction failed to show any blastogenic responsiveness of murine splenocytes to Concanvalin A (Con A) and lipopolysaccharide (LPS). Similarly, it did not display any mitogenic activity. Thus, the present study has shown the in vivo immunostimulatory activity of B. diffusa alkaloidal fraction without an in vitro effect.

Hindustan Antibiot Bull 1997 Feb-Nov;39(1-4):56-60
In vitro evaluation of inhibitory nature of extracts of 18-plant species of Chhindwara against 3-keratinophilic fungi.
Qureshi, S., et al.
Effect of extract of 18 plant species, viz., Acorus calamus, Adhatoda vasica, Amomum subulatum, Andrographis paniculata, Boerhaavia diffusa, Cassia occidentalis, Centella asiatica, Cymbopogon citratus, Hemidesmus indicus, Hyptis suaveolens, Malvestrum sp., Passiflora edulis, Pergularia daemia, Peristrophe bicalyculata, Shuteria hirsuta, Solanum nigrum, Tecoma stans, and Verbascum chinense on the growth of Microsporum gypseum, Chrysosporium tropicum and Trichophyton terrestre was evaluated and discussed. The sensitivity of the keratinophilic fungi was evaluated by dry-weight method. The maximum inhibition of mycelial growth was shown by M. gypseum (86.62%) followed by T. terrestre (81.86%) and C. tropicum (74.06%) when treated with S. hirsuta whereas the minimum inhibition was exhibited by M. gypseum (0.29%), C. tropicum (0.16%) and T. terrestre (1.76%) when tested with the extract of P. edulis, A. vasica and B. diffusa respectively.

Planta Med 1991 Aug;57(4):315-6
An experimental evaluation of possible teratogenic potential in Boerhaavia diffusa in Albino rats.
Singh, A., et al.
The present study was undertaken to evaluate any possibility of teratogenic effects in Boerhaavia diffusa (Punarnava), a widely used herbal medicine for renal and urinary tract diseases by Ayurvedic physicians in India. The ethanolic extract of Boerhaavia diffusa (BDE) was administered daily in a dose of 250 mg/kg, body weight p.o., to pregnant albino female rats during the entire period of gestation. BDE was found to be devoid of any teratogenic effect as litter size and survival rate of foetuses were the same as for the normal control group and no foetal anomaly could be detected.

Chem Pharm Bull (Tokyo) 1991 Jun;39(6):1551-5
Constituents of the roots of Boerhaavia diffusa L. III. Identification of Ca2+ channel antagonistic compound from the methanol extract.
Lami, N., et al.
Two known lignans, liriodendrin and syringaresinol mono-beta-D-glucoside, have been isolated from the methanol extract of the roots of Boerhaavia diffusa L. (Nyctaginaceae), and the former compound was found to exhibit a significant calcium (Ca2+) channel antagonistic effect in frog heart single cells using the whole-cell voltage clamp method. Reexamination of the carbon-13 nuclear magnetic resonance (13C-NMR) spectra of these compounds was also carried out by the use of two-dimensional NMR techniques including a 1H-detected heteronuclear multiple bond connectivity (HMBC) experiment, and it was found that the previous signal assignments for C-1' and C-4' have to be revised.

J Ethnopharmacol 1991 Mar;31(3):299-307
Boerhaavia diffusa: a study of its hepatoprotective activity.
Chandan BK, et al.,
An alcoholic extract of whole plant Boerhaavia diffusa given orally exhibited hepatoprotective activity against experimentally induced carbon tetrachloride hepatotoxicity in rats and mice. The extract also produced an increase in normal bile flow in rats suggesting a strong choleretic activity. The extract does not show any signs of toxicity up to an oral dose of 2 g/kg in mice.

Adv Contracept 1991 Mar;7(1):67-76
Management of IUD-associated menorrhagia in female rhesus monkeys (Macaca mulatta).
Barthwal, M., et al.
The study was undertaken to evaluate the effect of antifibrinolytic agents (epsilon-aminocaproic acid, EACA; tranexamic acid, AMCA), anti-inflammatory drugs (indomethacin, IND; ibuprofen, IBU; naproxen, NAP) and root extract of the plant Boerhaavia diffusa (BD) on menstrual cycle length (MCL), duration of menstrual flow (DMF), menstrual iron loss (MIL) and activity of uterine tissue plasminogen activator (tPA) in IUD-fitted monkeys. Premature onset of menstruation was observed in IUD-fitted monkeys (26.0 +/- 0.7 days, mean +/- SE) as compared to controls (28.7 +/- 0.4 days). No noteworthy change was observed in the MCL of drug treated monkeys as compared to IUD-fitted monkeys. An increase of 155%, 123.2%, and 288% was observed in the DMF, MIL and tPA activity after IUD insertion as compared to controls. Antifibrinolytic agents reduced the DMF, MIL and activity of tPA in IUD-fitted monkeys up to 117.4%, 116.4%, and 254%, whereas anti-inflammatory drugs caused a decrease only up to 69%, 95.1%, and 138%, respectively. Conclusively, root extract of B. diffusa treated IUD-fitted monkeys showed noticeable reduction in their DMF (124%), MIL (120.8%) and tPA activity (272%).

Zentralbl Mikrobiol 1986;141(5):415-9
Effect of root extract from Boerhaavia diffusa L., containing an antiviral principle upon plaque formation of RNA bacteriophages.
Awasthi, L. P., et al.
An extract obtained from the roots of Boerhaavia diffusa plants, which inhibits the infection of several plant viruses, was tested by the agar diffusion hole method for its action on RNA-containing bacterial viruses. Plaque formation of the phages was only partially and non-uniformly influenced by the extract so that a uniform principle of action was not realized for the RNA viruses of prokaryotic and eukaryotic host organisms.

Adv Contracept 1990 Jun;6(2):113-24
Histologic studies on endometrium of menstruating monkeys wearing IUDs: comparative evaluation of drugs.
Barthwal, M., et al.
A comparative study was performed to evaluate the effects of antifibrinolytic agents; epsilon-aminocaproic acid (EACA) and tranexamic acid (AMCA); anti-inflammatory drugs (indomethacin, ibuprofen, naproxen); and plant extract (root extract of Boerhaavia diffusa) on the endometrial histology of IUD-fitted menstruating monkeys. A high degree of stromal edema, heavy infiltration of inflammatory cells, long, tortuous endometrial glands, and thin-walled empty blood vessels were observed in IUD endometrium. B. diffusa was found most effective in reducing stromal edema, inflammation, and tortuosity of glands, and in increasing the degree of deposition of fibrin and platelets in the vessel lumen. Antifibrinolytic agents caused partial to complete occlusion of the vessel lumen and anti-inflammatory drugs thickened the vessel wall. Indomethacin reduced inflammation effectively. Conclusively, B. diffusa appears to be a potent antifibrinolytic and anti-inflammatory agent and is, thus, recommended for the treatment of IUD menorrhagia.

Afr J Med Med Sci 1999 Sep-Dec;28(3-4):167-9
Antimicrobial screening of Bridelia, micrantha, Alchormea cordifolia and Boerhavia diffusa.
Abo, K. A., et al.
This report is on the antimicrobial potential of Bridelia micrantha, Alchornea cordifolia and Boerhavia diffusa sourced from traditional healers through an ethnobotanical survey of antiinfective plants in Egbado South in Ogun State, Nigeria. Extracts of B. micrantha and A. cordifolia exhibited significant inhibitory activity against the pathogenic organisms. In some cases, the antibacterial activity was comparable to those of ampicillin and gentamycin. However, only the leaf of A. cordifolia showed reasonable antifungal activity when compared with Trosyd. The study shows that there is justification for the use of these medicinal plants in traditional medicine.

J Ethnopharmacol 1997 Mar;56(1):61-6
Hepatoprotective activity of Boerhaavia diffusa L. roots--a popular Indian ethnomedicine.
Rawat A. K., et al.
The roots of Boerhaavia diffusa L., commonly known as 'Punarnava', are used by a large number of tribes in India for the treatment of various hepatic disorders. In the present study the effect of seasons, thickness of roots and form of dose (either aqueous or powder) were studied for their hepatoprotective action to prove the claims made by the different tribes of India. The hepatoprotective activity of roots of different diameters collected in three seasons, rainy, summer and winter, was examined in thioacetamide intoxicated rats. The results showed that an aqueous extract (2 ml/kg) of roots of diameter 1-3 cm, collected in the month of May (Summer), exhibited marked protection of a majority of serum parameters, i.e. GOT, GPT, ACP and ALP, but not GLDH and bilirubin, thereby suggesting the proper size and time of collection of B. diffusa L. roots for the most desirable results. Further, the studies also proved that the aqueous form of drug (2 ml/kg) administration has more hepatoprotective activity than the powder form; this is probably due to the better absorbtion of the liquid form through the intestinal tract.